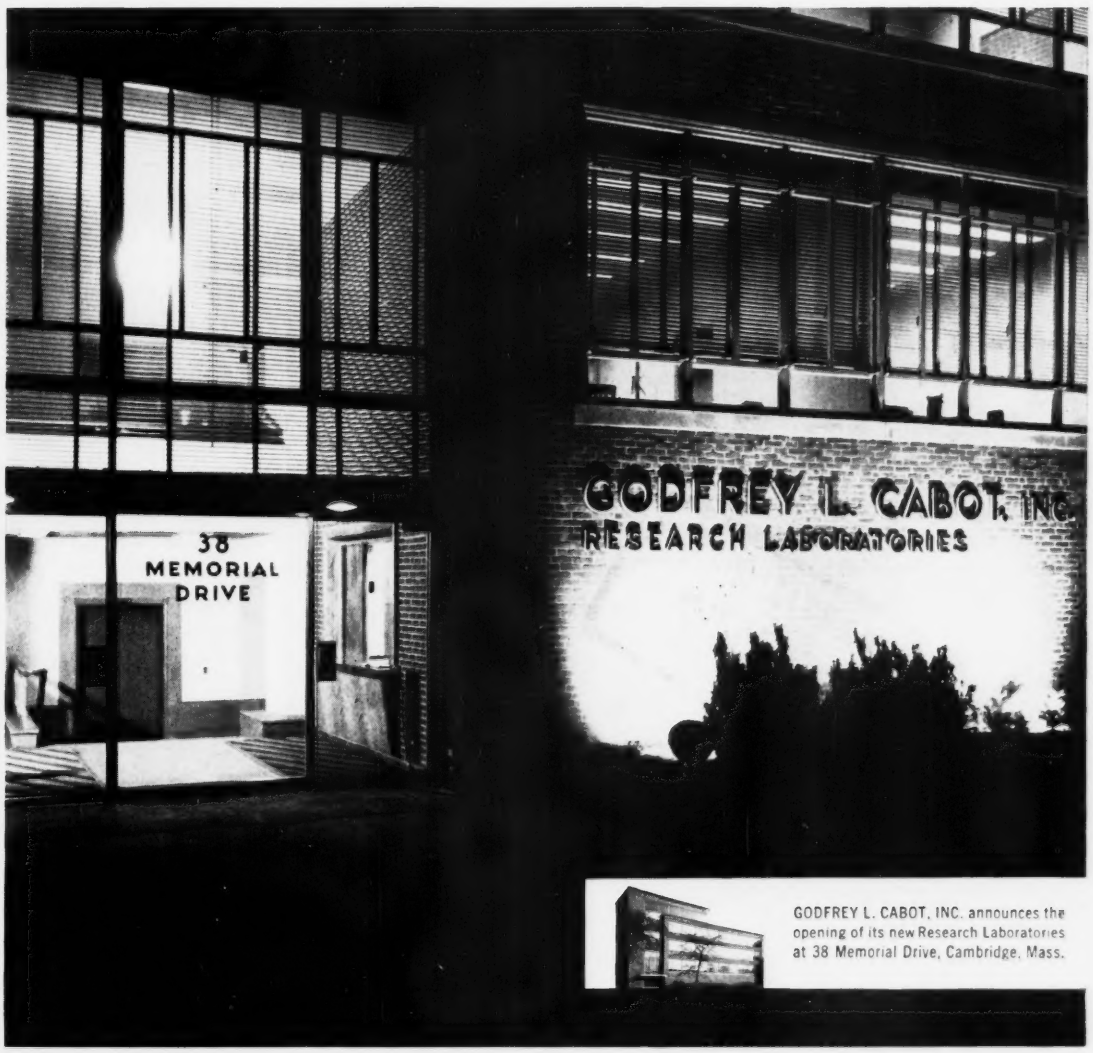
INDIA RUBBER WORLD

OUR 64th YEAR

A BILL BROTHERS PUBLICATION

MAY, 1953



GODFREY L. CABOT, INC. announces the opening of its new Research Laboratories at 38 Memorial Drive, Cambridge, Mass.

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THERE'S A TYPE TO MEET YOUR EXACT REQUIREMENTS

DRY NEOPRENES

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TYPE GN. Suitable for use in non-staining and light-colored compounds.

TYPE GN-A. Contains a stabilizer that results in improved storage stability; will stain and discolor.

TYPE GRT. Recommended for compounds requiring improved tack retention and maximum resistance to crystallization.

TYPE W. Possesses outstanding storage stability and excellent processing characteristics. Produces vulcanizates having light color, good heat resistance and low permanent set.

TYPE WRT. For use wherever the properties of Type W are desired plus maximum resistance to crystallization.

SPECIAL-PURPOSE TYPES

TYPE AC. Especially developed for quick-setting adhesive cements. Superior in stability and color.

TYPE KNR. Especially developed for high-solids cements, putties and doughs.

TYPE Q. For maximum resistance to oils, chemicals and solvents, particularly EP lubricants, refrigerants and non-flammable hydraulic fluids.

TYPE S. Especially developed for crepe soles. Also used as a stiffening agent for processing other neoprenes.

NEOPRENE LATICES

TYPE 571 (Solids 50%±1%)—General-purpose type for most applications.

TYPE 572 (Solids 50%±1%)—Fast-setting, high wet-strength type for adhesives.

TYPE 601A (Solids 59%±1%)—For dipped and coated goods and for foam. Improved resistance to crystallization.

TYPE 735 (Solids 35%±1%)—A sol type latex. Specially suited for paper making. Used with other latices to improve wet gel strength and extensibility.

TYPE 842A (Solids 50%±1%)—General-purpose, fast-curing type; vulcanizates have improved resistance to crystallization. Recommended for dipping, saturation, and as a binder for fibers.

NEOPRENE RESISTS:
Oxidation • Heat • Sunlight • Ozone • Oils • Grease • Chemicals • Aging • Abrasion • Flame • Flex-Cracking.

JUST PUBLISHED—*"The Neoprenes." Here's a 250-page book on the principles of compounding and processing all types of dry neoprene. It's free for the asking. Your Du Pont representative will be glad to secure a copy for you. Just write or phone the nearest Rubber Chemicals district office.*

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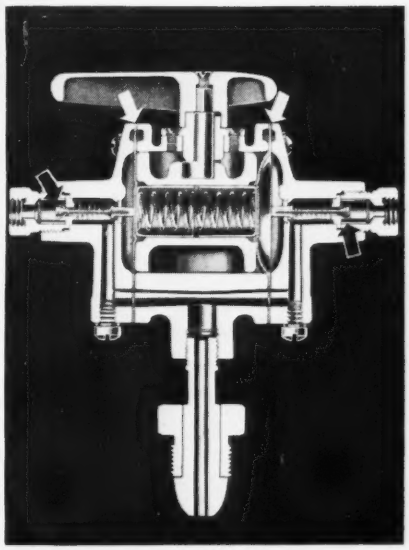
India RUBBER WORLD, May, 1953, Vol. 128, No. 2. Published monthly by BILL BROTHERS PUBLISHING CORP. Office of Publication, 1309 Noble Street, Philadelphia, Pa., with Editorial and Executive Offices at 386 Fourth Avenue, New York 16, N. Y., U.S.A. Entered as Second Class Matter at the Post Office at Philadelphia, Pa., under the act of March 3, 1879. Subscription United States and Mexico, $5.00 per year; Canada $6.00; All other Countries $7.00; Single Copies 50 cents. Address Mail to N. Y. Office.

Another new development using

B. F. Goodrich Chemical *raw materials*



Automatic Change-over Regulator made by Fisher Governor Co., Marshalltown, Iowa. Rubber valves molded by Associated Rubber, Inc., Quakertown, Pa. B. F. Goodrich Chemical Company supplies the Hycar rubber only.

HYCAR KEEPS LP-GAS REGULATOR WORKING

—in any weather!

THIS regulator is built to keep a constant supply of LP-Gas flowing on bitter cold or hottest days. And keeping the *regulator* working is just the kind of a job that Hycar rubber does so well.

When the gas pressure in one tank of the dual-tank system reaches a low point, the regulator opens the other tank automatically. Gas supply is uninterrupted. Empty tanks can be replaced easily without loss of efficiency.

Vital parts of this regulator are the Hycar rubber pressure-activated valves and two Hycar-coated nylon diaphragms. To assure unfailing operation, the valve must seat properly without sticking to the metal surface. The valves and the diaphragms must also resist the deteriorating effects of liquified petroleum gas and extreme outdoor temperature changes. On every count, Hycar fills the bill! Hycar resists oil, gas, corrosion and many chemicals—remains flexible under extreme temperatures and pressures.

Helping equipment do its job right is every-day work for Hycar. Perhaps one of the many Hycar rubber compounds can solve a problem for you, help you develop more saleable products. We'll help you select the right Hycar rubber compound for your needs. For technical information, please write Dept. HA-5, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

B. F. Goodrich Chemical Company
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Try these for size. There's a Philblack that fits your product to a T!

Philblack E beats any black for "toughness." This SAF black makes the longest-wearing tire treads ever! Outstanding abrasion resistance! Super protection against cut and crack growth.

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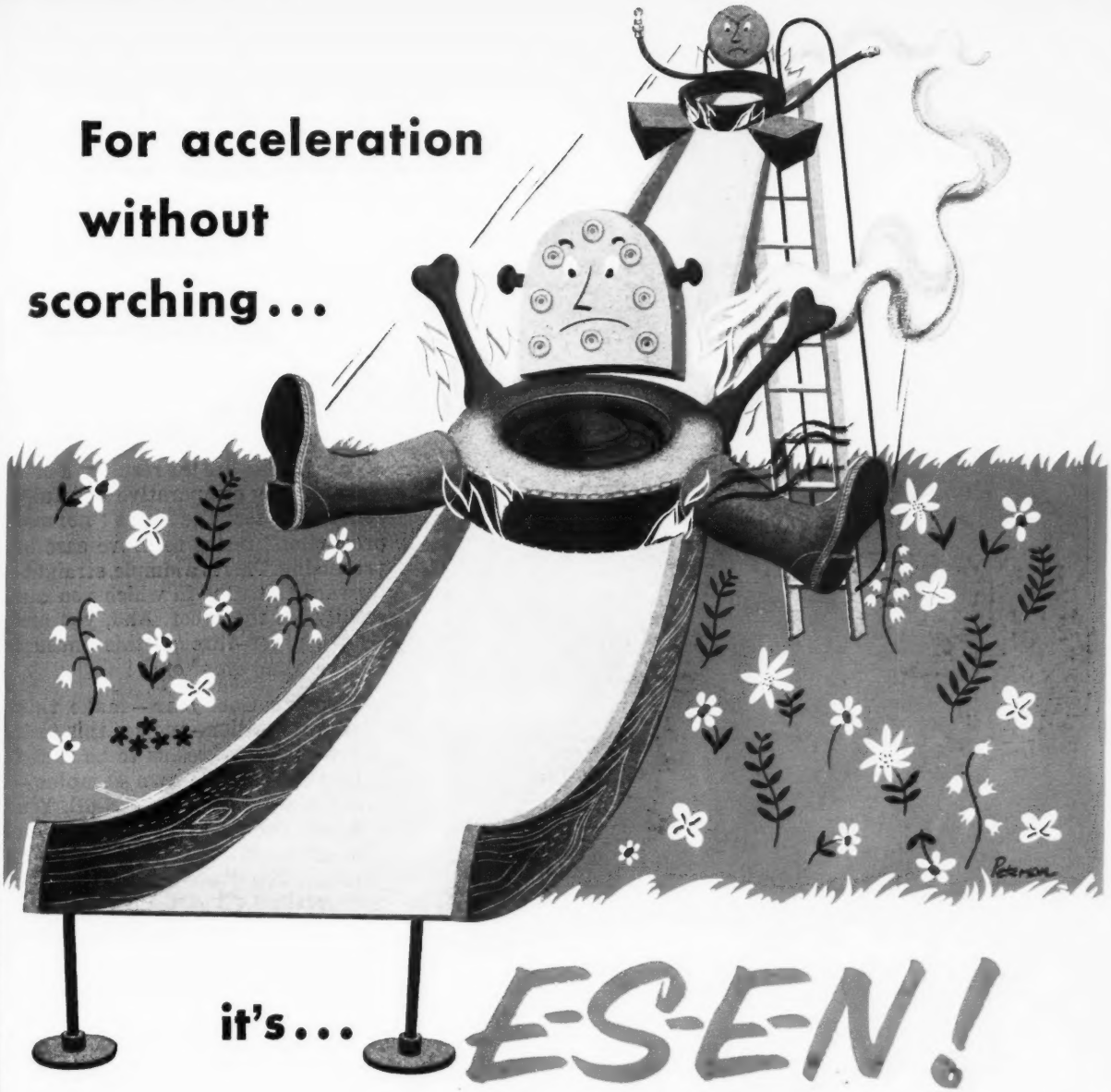
Philblack E, Philblack O, and Philblack A are manufactured at Borger, Texas. Warehouses in Akron, Boston, Chicago and Trenton. West Coast agent: Harwick Standard Chemical Company, Los Angeles. Canadian agent: H. L. Blachford, Ltd., Montreal and Toronto.

For acceleration without scorching...



it's... E-S-E-N!

For complete rubber processing safety, you'll find there's nothing to equal E-S-E-N.

This retarder and anti-scorch agent gives maximum protection against scorching during processing—with minimum effect on cure time.

What's more, it has no effect on aging, tensile, or other physical properties.

E-S-E-N is extremely effective with all accelerators, in natural rubber, GR-S, and nitrile type rubber such as PARACRIL.® A fine white powder, it has very good storage stability, and disperses quickly. Only from ¼ to 1 part of E-S-E-N is required per 100 parts of rubber hydro-carbon. And it's odorless, non-blooming, and relatively non-discoloring.

Find out more about E-S-E-N, its compounding, and the processing advantages it offers you. Send the coupon below.

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Take a close look at the samples shown below! They are easy-to-see proof of the superior processability of PLIOLITE S-6B – the outstanding resin for reinforcing rubber.

These samples are the result of a new test – a fully comparative and fully conclusive test that uses "normal production" resins to prove ease of processing. This is a simple, straightforward test. One in which you can readily see the proof. And, you *can* see the proof–through this unusual "before your eyes" offer!

Come to Goodyear – make this your invitation–and see this test. You name the resins to be tested or supply your own samples – including the PLIOLITE S-6B. You watch the entire procedure. You examine the dispersions that result. You prove to yourself that PLIOLITE S-6B gives you finer dispersions faster. All you need do is tell us of your interest.

For full details on how to see and believe the truly easy processability of PLIOLITE S-6B, write to:

Goodyear, Chemical Division
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Chemigum, Pliobond, Pliolite, Pliovic-
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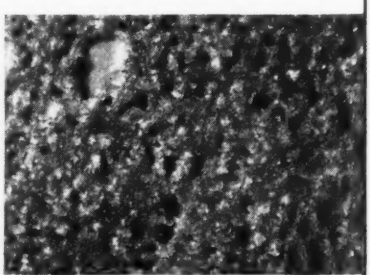
See this test– and see proof of better dispersions with PLIOLITE S-6B.

Test dispersion of PLIOLITE S-6B in GR-S rubber. Note smooth texture and absence of undispersed resin particles–sure signs of complete blending.



Test dispersion of Resin A in GR-S rubber. Rough surface and undispersed resin particles illustrate incomplete mixing.

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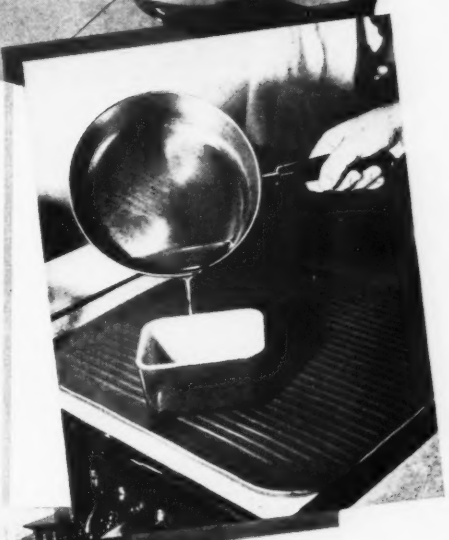

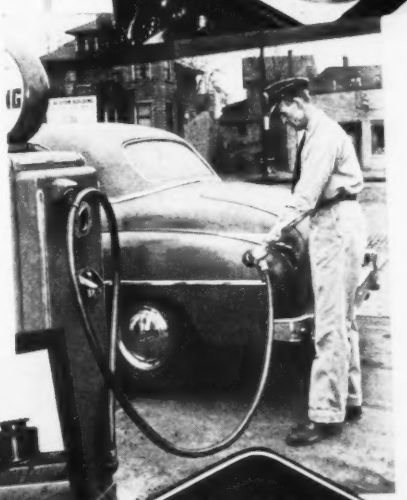

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resisting heat, oil, grease, gasoline, solvents

Fuel Oil and Gasoline Hose
Pipe Line Connections
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Gaskets for grease and solvent containers
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Cable Covers
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Wherever close tolerances, physical properties and good appearance must be maintained, along with outstanding resistance to heat aging, oils, greases and solvents, you can count on CHEMIGUM. This use-proved Goodyear synthetic is the easiest-processing nitrile rubber you can use.

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Sunk by rubber quality problems?

Skellysolve for Rubber and Related Industries

SKELLYSOLVE-B. For making quick-setting cements for the shoe, tape, container, tire and other industries. Quick-drying, with no foreign taste or odor in dried compound.

SKELLYSOLVE-C. For making quick-setting cements with a somewhat slower drying rate than those compounded with Skellysolve-B.

SKELLYSOLVE-D. For cements and variety of manufacturing operations. Good odor. Quick drying. Minimum of heavy, greasy compounds.

SKELLYSOLVE-H. For general use in manufacturing operations and cements, where faster evaporation rate than that of Skellysolve-D is desired.

SKELLYSOLVE-E. For use wherever a relatively slow drying solvent is desired.

SKELLYSOLVE-R. For general use in tire building and a variety of other manufacturing operations and cements. Reduces evaporation losses. Medium quick final dry. Lessens bloating and skinning tendency.

"Doc" MacGEE says: If you can't afford to take chances on the quality of *your* rubber product—don't risk using unknown solvents in your manufacturing processes. You're *certain* of getting all the solvent characteristics you need when you specify Skellysolve. It's made to protect your product and your production lines.

Uniformity is always assured when your solvent is Skellysolve. No batch-to-batch variations that might "raise Cain" with your plant operations. Strict quality control at Skellysolve helps guard the quality of your product and its sales appeal.

Specifically, Skellysolve is 100% dependable for low end points, controlled evaporation, low vapor pressure, a minimum of unsaturates and pyrogenic decomposition products. Minimum levels of low and high boiling compounds help reduce rejects caused by blushing and blisters.

Controlled vapor pressure reduces danger of bloated containers, and a minimum of low boiling compounds means freedom from seeds in rubber cements. And absence of greasy residues pays off in higher bonding strength for rubber cements.

Technical facts in complete detail are yours for the asking. Write today. And for special help on solvent application problems, consult with the Skellysolve Technical Fieldman. No obligation.

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maintains Pelletex superiority as the SRF standard of the entire carbon black industry. Hundreds of tests are made daily in Cabot laboratories to assure uniformly excellent performance in all types of SRF rubber compounds. Resilience, abrasion resistance, state of cure, aging . . . these are but a few of the tests made regularly in a laboratory program which guarantees highest product quality.
Here a Cabot chemist demonstrates use of the National Bureau of Standards Strain Tester to determine tensile, modulus and elongation values of Pelletex-compounded rubber stock.
GENERAL ATLAS DIVISION of Cabot Carbon Co.
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CABOT
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Inquire about Oronite

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—economical plasticizers and rubber extenders

Oronite Polybutenes are an economical rubber extender in the manufacture of a wide variety of molded or extruded rubber products. Their light color makes them specially adaptable to molded rubber products of white or pastel colors.

In addition to extending, Polybutenes plasticize the mass of rubber making it more pliable for easy milling. They also assist in milling reclaimed rubber batches while acting as an extender, and have a field of usefulness in plasticizing various synthetic rubbers.

Product characteristics

Oronite Polybutenes are clear, light colored, chemically stable liquids of moderate to high viscosity and tackiness. They have excellent aging characteristics—do not become gummy or waxy, do not harden, darken or change in any essential property over long periods of atmospheric exposure. They can be readily emulsified using standard techniques and equipment. In the emulsified form, or in their natural form, they are useful as tackifiers, plasticizers or extenders for natural or synthetic rubber latices. Complete information is available in a technical bulletin.

Write or phone the Oronite office nearest you and talk over your problem with us.

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THE NAME TO WATCH IN CHEMICALS

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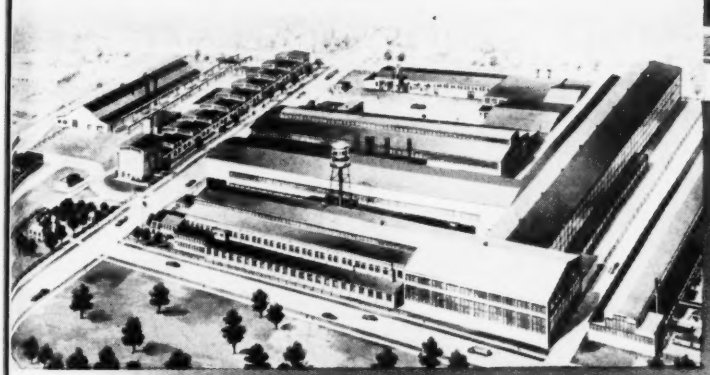
The Right Combination for rubber and plastics equipment, planning and processing

An experienced Engineering Organization with the "KNOW-HOW" of rubber and plastics process engineering and machine design.



A machinery manufacturing plant with the "KNOW-HOW" resulting from years of experience in building quality equipment.

the whole job from idea to production or any part thereof

This combination of Hale and Kullgren, Inc., and The Aetna-Standard Engineering Company offers a complete service to the rubber and plastics industry. We are equipped to deliver a complete plant, a specialized process, an engineering service or individual machines for processing rubber and plastics. For instance, some of our current projects are—a Phenolic Resin Molding Powder Plant; a Tire Manufacturing Plant; a Process for Manufacturing Plastic Pipe; a Compounding System and Mill Room for Mechanical Rubber Goods Plant.

We also engineer, build and service the famous National Erie line of rubber and plastics processing equipment.

If you need experienced and competent help in processing or manufacturing—call on us.

your inquiry

Whatever your requirements in plastics or rubber equipment or planning, address your inquiry to:
Hale and Kullgren, Inc.,
P. O. Box 1231, Akron, Ohio.
Give us an outline of your needs and we will give you prompt and authentic information.

National Erie products for the Plastic and Rubber Industries • Extruders • Simplex Doors for Autoclaves • Mills and Hydraulic Presses.

• This old and well-known line of machinery was acquired March 1, 1952, by The Aetna-Standard Engineering Company. They are manufactured in their Warren, Ohio and Ellwood City, Pa., plants. The sales and engineering of the National Erie line is the responsibility of Hale and Kullgren, Inc., Akron, Ohio.

SALES and ENGINEERING by

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MANUFACTURING by

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PITTSBURGH, PA

Plants in Warren, Ohio
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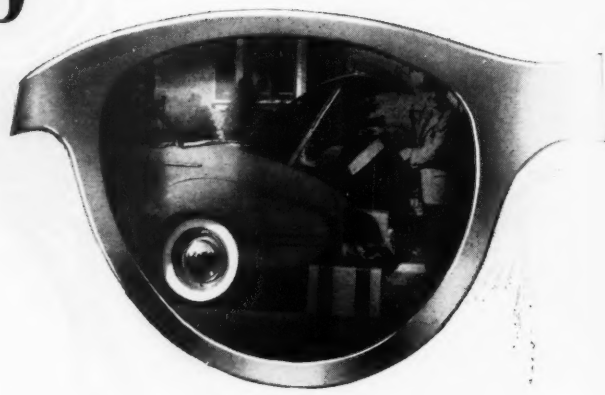
Titanox-for GOOD LOOKS in WHITE WALLS



White sidewalls pigmented with Titanox titanium dioxide pigments are the cleanest, brightest white you've ever seen and they stay that way. Titanox pigments can contribute more to white sidewalls than just good looks. Indications are that Titanox "non-chalking" rutile pigments—especially TITANOX-RA-NC—fortify white walls against crazing, chalking and checking...help maintain the even, brilliant original white of new tires.

Physically and chemically stable, Titanox titanium dioxide pigments are compatible with natural and synthetic rubbers, as well as compounding ingredients. Our Technical Service Department is ready at any time to help you choose the best Titanox pigments for your rubber formulations. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; Boston 6; Chicago 3; Cleveland 15; Los Angeles 22; Philadelphia 3; Pittsburgh 12; Portland 9, Ore.; San Francisco 7. In Canada: Canadian Titanium Pigments Limited, Montreal 2; Toronto 1.

1158

TITANOX

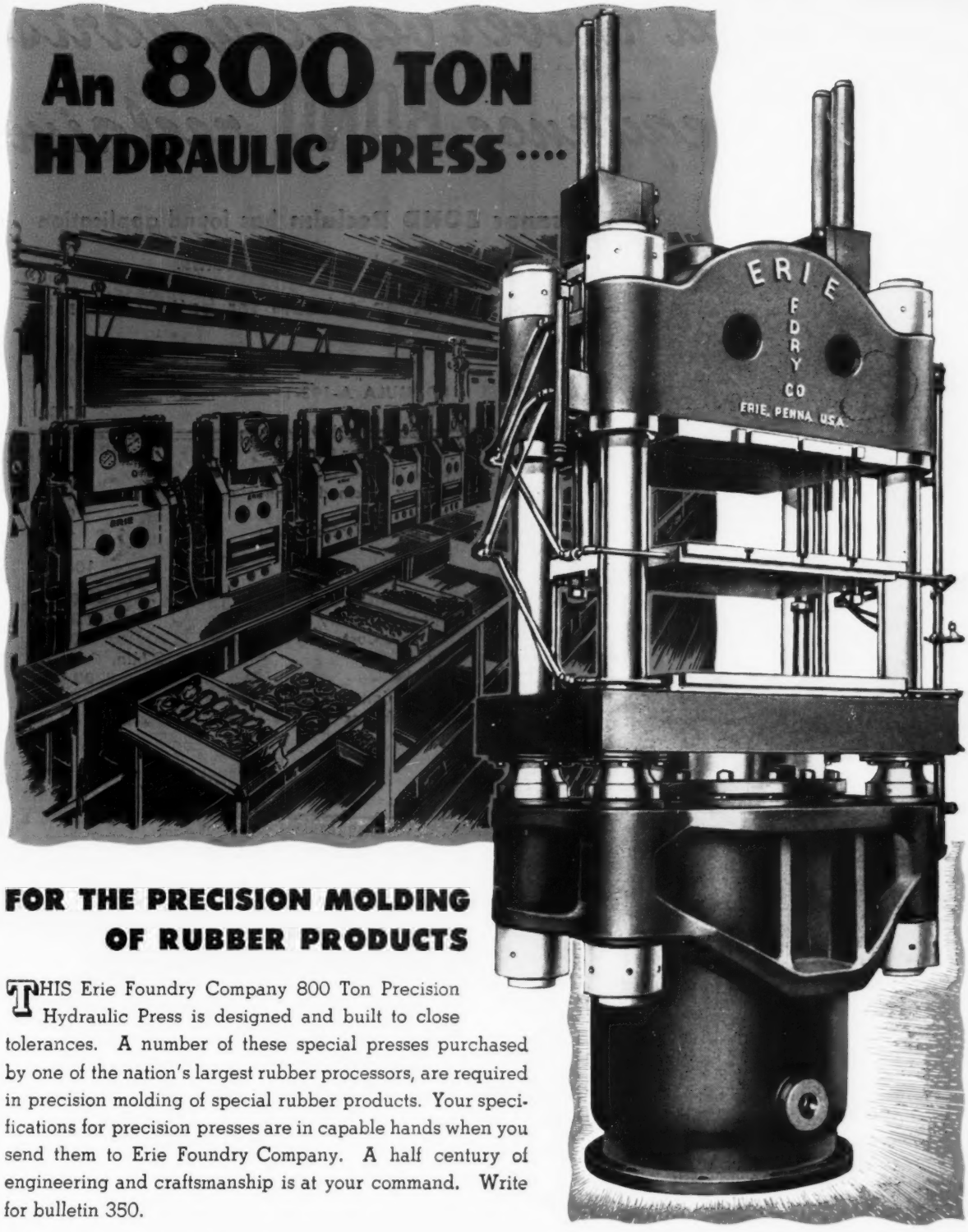
the brightest name in pigments

TITANOX

TITANIUM PIGMENT CORPORATION

Subsidiary of NATIONAL LEAD COMPANY

An 800 TON HYDRAULIC PRESS....



FOR THE PRECISION MOLDING OF RUBBER PRODUCTS

THIS Erie Foundry Company 800 Ton Precision Hydraulic Press is designed and built to close tolerances. A number of these special presses purchased by one of the nation's largest rubber processors, are required in precision molding of special rubber products. Your specifications for precision presses are in capable hands when you send them to Erie Foundry Company. A half century of engineering and craftsmanship is at your command. Write for bulletin 350.

ERIE FOUNDRY COMPANY HYDRAULIC PRESSES

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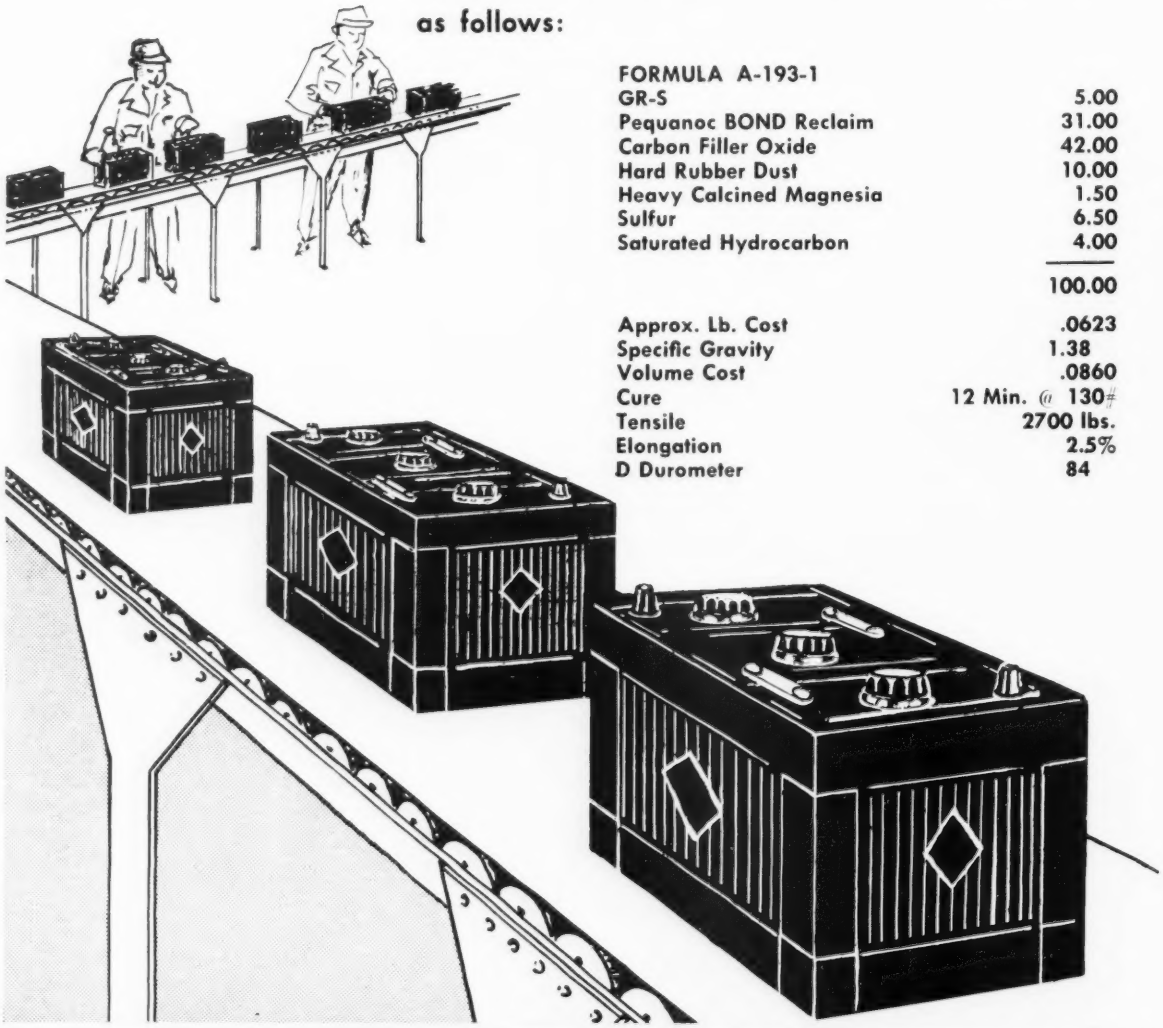
For hard rubber battery parts use Pequanoc **BOND** *reclaim*

Pequanoc BOND Reclaim has found application in many competitive hard rubber items.

A typical formulation suitable for battery cases is as follows:



FORMULA A-193-1	
GR-S	5.00
Pequanoc BOND Reclaim	31.00
Carbon Filler Oxide	42.00
Hard Rubber Dust	10.00
Heavy Calcined Magnesia	1.50
Sulfur	6.50
Saturated Hydrocarbon	4.00
	100.00
Approx. Lb. Cost	.0623
Specific Gravity	1.38
Volume Cost	.0860
Cure	12 Min. @ 130#
Tensile	2700 lbs.
Elongation	2.5%
D Durometer	84

Pequanoc Rubber Co.

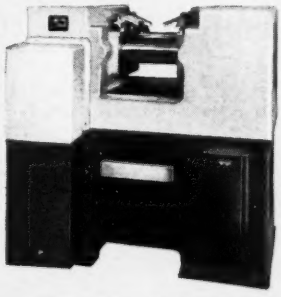
MANUFACTURERS OF RECLAIMED RUBBER

MAIN SALES OFFICE and FACTORY: BUTLER, N. J.

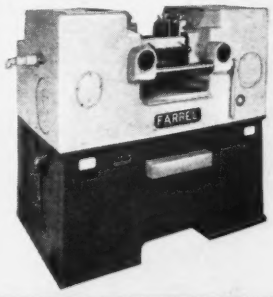
One of these FOUR DESIGNS may be just THE LABORATORY MILL you need

1 — FRONT VIEW

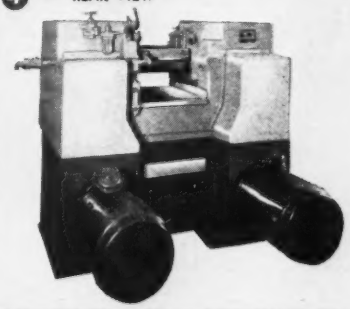
2 — REAR VIEW



3 — FRONT VIEW



4 — REAR VIEW



	Method of Speed Control	No. of Motors	HP Each Motor	Friction Ratio	Roll Speed (RPM) Front	Roll Speed (RPM) Back
1	Constant	1(AC)	7½	1.4:1	23.5	33
2	Vari-pitch Pulley	1(AC)	7½	1.4:1	13 to 24	18 to 34
3	Vari-pitch Pulleys	2(AC)	5	Variable	20 to 38	18 to 34
4	Variable Voltage	2(DC)	5	Variable	4.5 to 34	6 to 45

Here is a standard, two-roll, 6″ x 13″ laboratory mill, which you can have with four different drive arrangements. One of these should give you exactly the roll speed, or speeds, and friction ratio you need for your experimental work.

Drive may be (1) by single AC motor with mill gearing to give constant roll speed and 1.4:1 friction; (2) by single AC motor driving the rolls through vari-speed sheaves to give a back roll speed range of 18 to 34 RPM and 1.4:1 friction; (3) by two AC motors with vari-speed drives for friction ratios from even speed up to 2.1:1; (4) by two DC motors with variable voltage control for ratios from even speed up to 10:1 friction.

Standard mills have self-contained automatic cascade lubrication, swinging scraper, tilting guides and knee-operated safety trip. Optional features include chrome-plated rolls, extra hand scraper, air-operated scraper, ratchet roll adjustment, and batch-off roll.

Send for further information about this versatile mill. Or, if you prefer, a Farrel-Birmingham engineer will be glad to discuss your laboratory equipment problems with you at any time.

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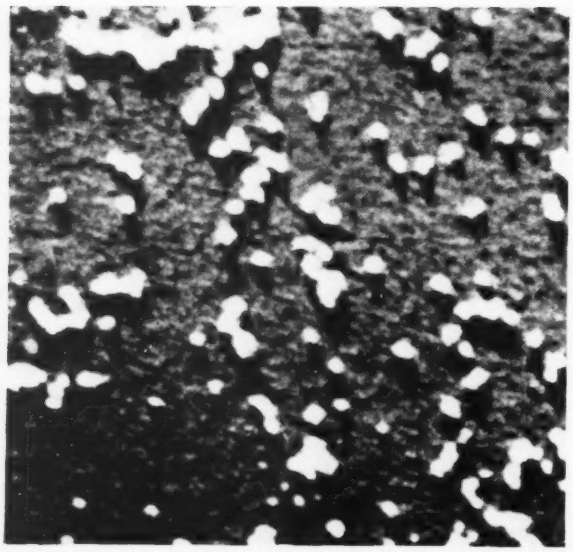
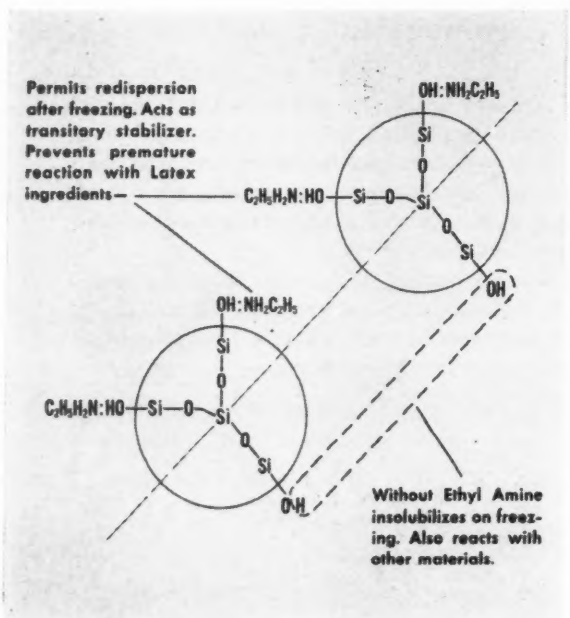
Farrel-Birmingham®

How Du Pont "LUDOX" can



What "LUDOX" is

"Ludox" is a 30% colloidal solution of almost pure amorphous silica particles (SiO_2) in the form of polymerized silicic acid. The electron photomicrograph—magnification 175,000 times—shows the fineness and uniformity of "Ludox" particles. The average particle's size of 17 millimicrons is below the range of the best carbon blacks.



Any of these valuable modifying effects can be produced by adding "LUDOX" to latex formulations

- Improved Adhesion
- Increased Stiffness
- Increased Water Resistance
- Increased Abrasion Resistance
- Decreased Dry Tack

How "LUDOX" works

The diagram at left shows surface hydroxyl groups on "Ludox" particles. These groups make the particles chemically reactive in contrast to commonly used dry fillers. This reactivity has led to many unusual properties and uses for "Ludox" in the latex field. The diagram also shows a typical "Ludox" reaction—with and without monoethylamine. The reaction with ethyl amine is useful in the stabilization of some latices containing "Ludox."

improve latex products

Your chemists can create new combinations of properties in latex-dipped goods, coatings, adhesives . . . whatever products you make—using Du Pont "Ludox"* colloidal silica. And new properties can mean new sales advantages—new markets for your products.

Here are some examples of how "Ludox" has improved latex products:

Neoprene thread was produced with a nearly doubled modulus over the entire range of elongation. Seven parts of "Ludox" were added per 100 parts neoprene latex. Modulus can be increased, too, in natural rubber films.

In neoprene-coated belting, adhesion was improved and flaking stopped by adding "Ludox." In a paper saturant, abrasion resistance was increased 20 to 40%!

A natural-rubber adhesive was doubled in strength of leather-to-leather adhesion when 20 parts of "Ludox" solids were added per 100 parts natural rubber latex solids. Such outstanding improvements have also led to the use of "Ludox" in GRS and neoprene latex adhesives and coatings.

An uncured Buna N solvent coating on cloth had no surface tack whatsoever when treated with "Ludox." In decreasing or eliminating tackiness, "Ludox" can be applied as an aftercoat or, in the case of latex, incorporated in the compound.

Neoprene films have shown exceptional increases in water resistance and decreases in water swelling upon addition of 20 parts "Ludox" solids per 100 parts neoprene latex solids.

Neoprene foam required about 20% less solids to attain a given modulus when 5 parts of "Ludox" solids were added per 100 parts dry neoprene. This saving of raw material was obtained without affecting flex life, bend flex, or compression set.

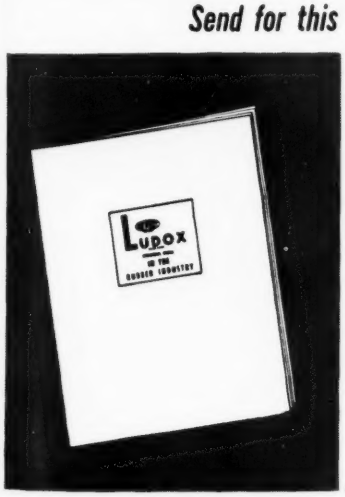
In these and other cases "Ludox" has provided combinations of properties difficult to achieve by any other means.

What's more, a little "Ludox" goes a long way.

To learn more about how silica chemistry with Du Pont "Ludox" can help improve your products, mail the coupon below, or write on your letterhead today.

*REG. U.S. PAT. OFF.

Send for this informative booklet: "'LUDOX' in the Rubber Industry"



E. I. du Pont de Nemours & Co. (Inc.)
Grasselli Chemicals Department, Wilmington 98, Delaware

Name_____ Title_____

Company_____

Address_____

City_____ State_____

DU PONT "LUDOX" COLLOIDAL SILICA

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING...THROUGH CHEMISTRY

For Rubber Compounding Use VELSICOL RESINS

NOW AVAILABLE IN VARYING MELTING-POINT RANGES AND COLORED GRADES

SOME SUGGESTED APPLICATIONS:

- Mechanical Goods
- Electrical Insulation Compounds
- Rubber Shoe Soles and Heels
- Rubber Floor Tiling
- Gaskets and Jar Rings
- Rubber Adhesives and Cements
- Molded Rubber Products
- Tubular Compounds
- Reclaimed Rubber Sheeting
- Colored Rubber Stocks
- Battery Cases
- Hard Rubber Compounds

FEATURES:

1. THERMOPLASTIC HYDROCARBON RESINS.
2. COMPATIBLE WITH NATURAL AND SYNTHETIC RUBBERS.
3. EFFECTIVE PLASTICIZERS AND SOFTENERS . . . in highly-loaded clay stocks or in recipes incorporating carbon black.
4. MILL READILY.
5. EXCELLENT DISPERSING AGENTS FOR FILLERS AND PIGMENTS.
6. FACILITATE PROCESSING PROCEDURES . . . impart excellent milling, calendering processing and tubing characteristics to stocks.
7. IMPART EXCELLENT PERFORMANCE CHARACTERISTICS . . . such as good tensile strength, elongation and modulus, as well as good resistance to abrasion and aging.
8. POSSESS HIGH ELECTRICAL RESISTANCE PROPERTIES.
9. AID IN THE DEVELOPMENT OF NON-SCORCHY STOCKS . . . without excessive retardation of cure at high temperatures.

For additional information concerning properties and applications of Velsicol Resins, WRITE:

VELSICOL CORPORATION

General Offices and Laboratories
330 East Grand Avenue, Chicago 11, Illinois

Export Division
100 East 42nd Street, New York 17, New York

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VELSICOL
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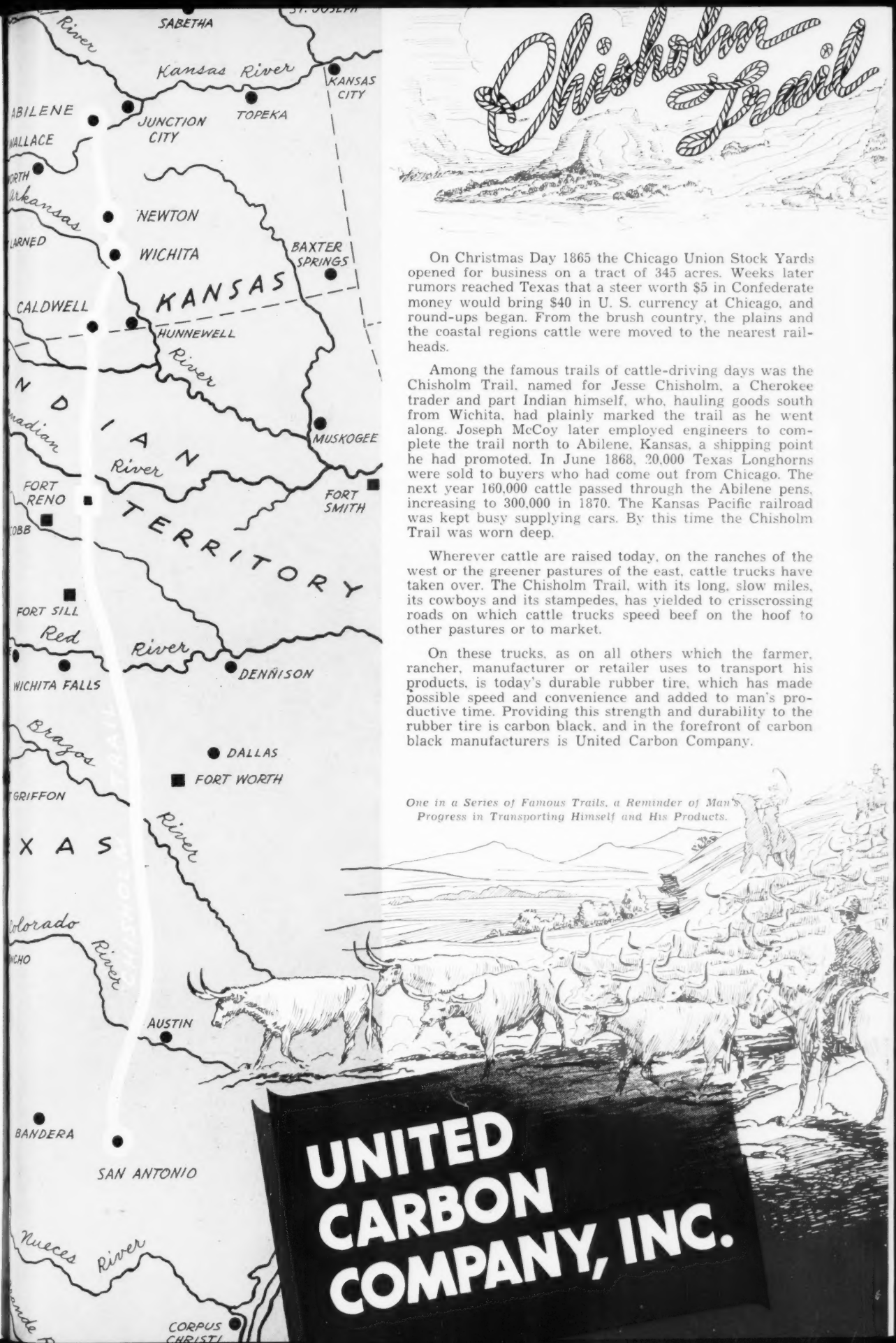

On Christmas Day 1865 the Chicago Union Stock Yards opened for business on a tract of 345 acres. Weeks later rumors reached Texas that a steer worth $5 in Confederate money would bring $40 in U. S. currency at Chicago, and round-ups began. From the brush country, the plains and the coastal regions cattle were moved to the nearest railheads.

Among the famous trails of cattle-driving days was the Chisholm Trail, named for Jesse Chisholm, a Cherokee trader and part Indian himself, who, hauling goods south from Wichita, had plainly marked the trail as he went along. Joseph McCoy later employed engineers to complete the trail north to Abilene, Kansas, a shipping point he had promoted. In June 1868, 20,000 Texas Longhorns were sold to buyers who had come out from Chicago. The next year 160,000 cattle passed through the Abilene pens, increasing to 300,000 in 1870. The Kansas Pacific railroad was kept busy supplying cars. By this time the Chisholm Trail was worn deep.

Wherever cattle are raised today, on the ranches of the west or the greener pastures of the east, cattle trucks have taken over. The Chisholm Trail, with its long, slow miles, its cowboys and its stampedes, has yielded to crisscrossing roads on which cattle trucks speed beef on the hoof to other pastures or to market.

On these trucks, as on all others which the farmer, rancher, manufacturer or retailer uses to transport his products, is today's durable rubber tire, which has made possible speed and convenience and added to man's productive time. Providing this strength and durability to the rubber tire is carbon black, and in the forefront of carbon black manufacturers is United Carbon Company.

One in a Series of Famous Trails, a Reminder of Man's Progress in Transporting Himself and His Products.

UNITED CARBON COMPANY, INC.

Paracril®

keeps cemented products together for good...

...preserves relationships in the presence of high and low temperatures, flexing, and many mineral, vegetable, and animal fats and oils!

This butadiene-acrylonitrile chemical rubber has very high tensile strength and unusually good aging properties. Available in both bale and crumb forms, in three grades of oil resistance, it is extremely easy to process —well suited for use in cements and solvated applications of all kinds.

With its wide range of possible solution viscosities, you'll find it ideal for bonding rubber, fabric, leather, metal, wood, or any combination of these and many other materials.

Try this new chemical rubber for your bonding applications. Write address below for free samples and Technical Bulletin on solvation of Paracril.

Naugatuck Chemical

Division of United States Rubber Company

135 ELM ST., NAUGATUCK, CONNECTICUT

IN CANADA: NAUGATUCK CHEMICALS DIVISION • Dominion Rubber Company, Limited, Elmira, Ontario

Rubber Chemicals • Aromatics • Synthetic Rubber • Plastics • Agricultural Chemicals • Reclaimed Rubber • Latices

A MATTER OF DOLLARS AND SENSE!

calcene tm • calcene nc

Now that the price of comparable grades of natural rubber is approaching that of GR-S, compounders will want to review ideas on appropriate formulation changes.

For color-sensitive white or pastel stocks, Calcene NC should be on your evaluation list. This new, white, non-coated calcium carbonate offers a level of properties, ease of production, and economies most needed in today's competitive market.

Where color problems are not so critical, Calcene TM will do a superior job of reinforcement. The coating agent used offers easier dispersion and makes Calcene TM your best value in the fine particle calcium carbonate field.

In general compound development, the *delivered volume cost* of Calcene TM or Calcene NC and properties similar to those with medium and fine thermal blacks may suggest further cost savings. Both grades of Calcene will also provide reinforcement equivalent to the finest particle calcium carbonates at considerably reduced expense.

We suggest that you review again Data Bulletin 52-4, or if you do not have a copy, consult our nearest office for the data and price information.

PHYSICAL PROPERTIES OF THESE EXCLUSIVE COLUMBIA-SOUTHERN PIGMENTS

	CALCENE TM	CALCENE NC
Average Particle Size	0.1 Micron	0.1 Micron
Specific Gravity	2.5	2.7
Wet Screen Test (on 325 mesh)	0.1% Max.	0.1% Max.
Color	Very Light Cream	White
Coating Agent	3.25-4.0%	—
Moisture	0.6% Max.	0.6% Max.
Oil Absorption	30-40	40-50

COLUMBIA-SOUTHERN
CHEMICAL CORPORATION
SUBSIDIARY OF PITTSBURGH PLATE GLASS COMPANY
FIFTH AT BELLEFIELD, PITTSBURGH 13, PA.

DISTRICT OFFICES: BOSTON • CHARLOTTE • CHICAGO • CINCINNATI • CLEVELAND • DALLAS • HOUSTON • MINNEAPOLIS
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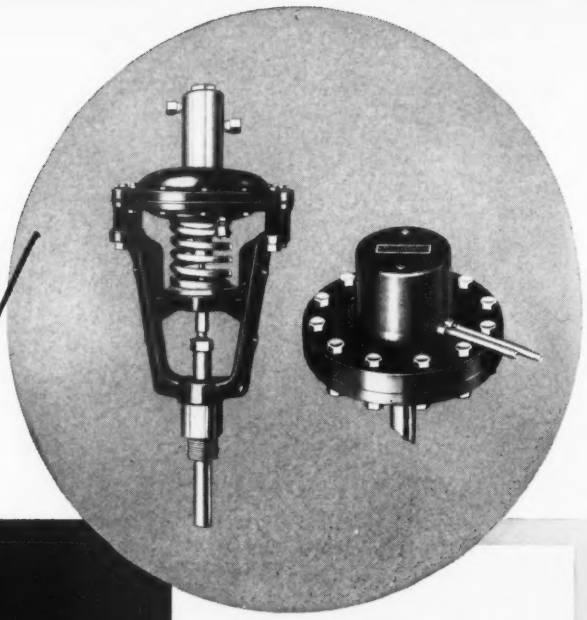
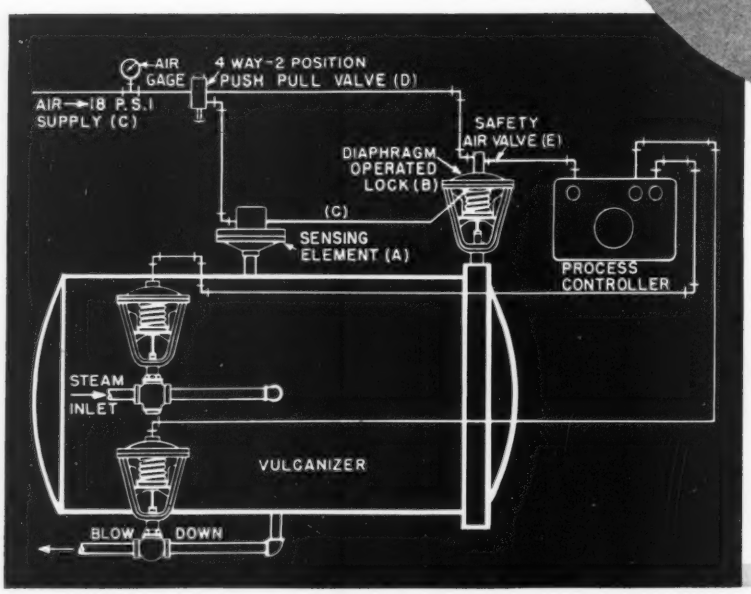




WESTON *Safety* DOOR LOCK

for vulcanizers and other pressure vessels

Here's a truly automatic Safety Door Lock . . . one which requires no thought or action on the operator's part.

The door locks automatically whenever pressure reaches 10″ of water . . . and it unlocks automatically *only* when pressure drops to that safe level.

The secret is the new but thoroughly proved sensing element, developed by WESTON, which operates dependably at the extremely low level of 10″, or even less . . . yet withstands pressures up to 150 p.s.i. Elements for higher pressures also are available.

Installation of the WESTON Safety Door Lock is simple and quick. The complete story is available in bulletin form. Write for your copy. WESTON Electrical Instrument Corporation, 614 Frelinghuysen Avenue, Newark 5, New Jersey.

WESTON **WESTON** *Instruments*

2573

NEW

Produced by **HYDROXLYATION** a new process for chemically modifying fats and oils

COMMERCIALLY AVAILABLE

PLASTICIZERS

- CELLULOSIC RESINS
- SYNTHETIC RUBBER

ESTANOX 203
Butyl Hydroxy-Acetoxy Ester

- VINYL RESINS

ESTANOX 206
Butyl Polyacetoxy Ester

PERFORMANCE ADVANTAGES

GOOD COMPATIBILITY
Excellent solubilizing characteristics imparted by controlled introduction of hydroxy and acetoxy groups.

LOW VOLATILITY
Chain length and high molecular weight guarantee good permanence.

EXCELLENT IMPARTED FLEXIBILITY
Planned chemical structure specially designed for high plasticizing efficiency.

FREEDOM FROM RANCIDITY
Low iodine value, less than 20, assures oxidation stability.

Mail convenient coupon for samples and technical data sheets. Please clip to your letterhead.

ESTABLISHED 1857 Baker

THE BAKER CASTOR OIL COMPANY

120 BROADWAY, NEW YORK 5, N. Y.

LOS ANGELES • CHICAGO

The Baker Castor Oil Company RW-53
120 Broadway, New York 5, N. Y.

Please send sample of ☐ 203; ☐ 206; also data sheets with physical and chemical characteristics.

Name_____

Firm_____

Address_____

City_____ Zone____ State_____

COATING AND PRINTING ROLLERS WITH OUTSTANDING SOLVENT RESISTANCE FROM *Thiokol** SYNTHETIC RUBBER TYPE FA

"Thiokol" Synthetic Rubber Type FA displays outstanding resistance to swelling in esters, ketones and aromatic solvents. As a result, it is widely used as the elastomer for lacquer, paint and printing rollers of superior quality. "Thiokol" FA rollers outlast many other types and retain their dimensional stability throughout their long life.

The following formulations illustrate several typical compounds used in the fabrication of rollers from "Thiokol" FA:

LACQUER, PAINT AND PRINTING ROLLER RECIPES

"Thiokol" FA Mb[1]	115	115	115	115
Neoprene Type W	30	30	30	30
E. L. Cal. Mag.	1.2	1.2	1.2	1.2
Neozone D	0.5	0.5	0.5	0.5
Stearic Acid	1	1	1	1
NA-22	0.3	0.3	0.3	0.3
Zinc Oxide	10	10	10	10
SRF Black	2	2	25	60
Circo. Light Process Oil	35	25	—	—
Neophax A	30	—	—	—

Thiokol
[1] FA MASTERBATCH
"Thiokol" FA 100
BTDS[a] 0.4
DPG 0.15
Neophax A 15
([a] Benzothiazyl disulfide)

PHYSICAL PROPERTIES

Cure, min/°F	50/298	50/298	50/298	50/298
Shore A hardness	15	30	40	50
Tensile strength, p.s.i.	250	250	700	1000
Elongation, %	450	700	550	500
Volume Swell (30 days at 80°F), %				
SR-6	71	45	56	50
Methyl Ethyl Ketone	58	51	61	55
Acetone	5	15	25	20
Ethyl Acetate	38	35	46	38

PROCESSING INFORMATION

The "Thiokol" FA masterbatch is prepared by the following procedure:

1. Place the "Thiokol" FA on a tight mill at approximately 160°F.
2. Add the BTDS and DPG and mix until soft.
3. Add the Neophax A and blend until thoroughly incorporated.

Mix the final compound as follows:

1. Break down the Neoprene W. on a cold mill.
2. Add the "Thiokol" FA masterbatch, slowly at first. After approximately an equal amount of the FA masterbatch has been added to the Neoprene W, the remainder of the masterbatch can be incorporated as rapidly as desired.
3. Add all the dry powders.
4. Add the Neophax A and oil.

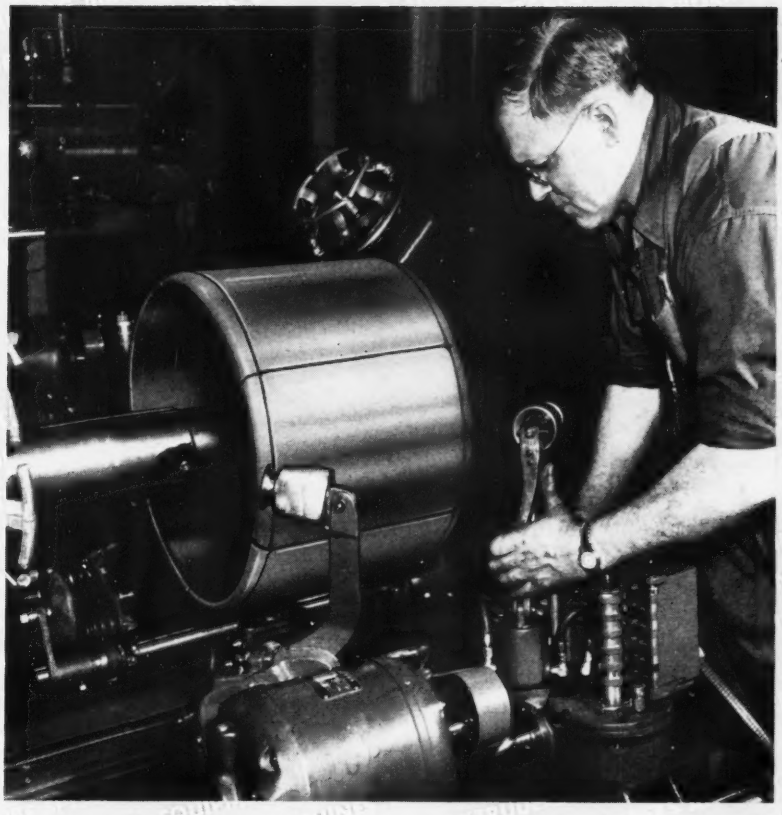
*Reg. U.S. Pat. Off.
Ptd. in U.S.A.

For complete information write to

*Thiokol** CORPORATION 784 North Clinton Avenue, Trenton 7, New Jersey

This information is believed to be accurate. However, no warranty is expressed or implied regarding the accuracy of these data, or the use of this product.

"TURN-UP TOOLS" ARE *CUSTOM BUILT* ON NRM



TIRE BUILDING MACHINES

The NRM Tire Building Machine above is a standard model . . . yet it is *custom-built!* The turn-up tools on this — and on all NRM Tire Building Machines — are specially made to meet the manufacturing requirements of the customer's particular type of tires, and so the machine will work in perfect accord with the production equipment existing in his plant.

From experience, the rubber industry knows that NRM's quarter-century of *creative engineering* has produced the most practical *basic* designs in rubber processing equipment. It knows, too, that every NRM machine is *custom* constructed, fitted and adjusted to give it top performance in a rubber production setup . . . to make it increase the "flow" of production in that plant.

2130

NATIONAL RUBBER MACHINERY COMPANY

NRM Our 25th ANNIVERSARY 1928-1953

Creative Engineering

General Offices & Engineering Laboratories: Akron 8, Ohio
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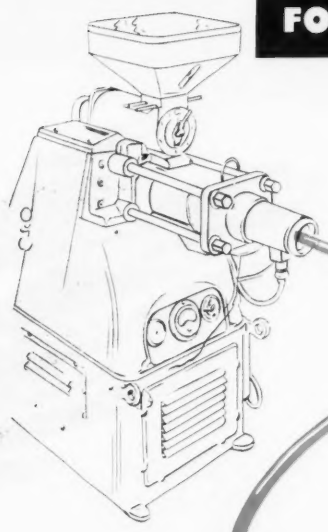
Export: Gillespie & Company, 96 Wall St., New York 5, N. Y.



FOR EXCELLENT

HEAT RESISTANCE

PLUS LIGHT STABILITY...

at MODERATE COST

...IN POLYVINYL CHLORIDES AND THEIR COPOLYMERS-

Use STABELAN HR

STABELAN HR is a synergized and chelated cadmium and barium compounded stabilizer . . .

STABELAN HR is **specifically** compounded to serve as a "single package" stabilizer for high-heat resistance plus excellent light stability . . .

STABELAN HR is a heavy paste at 75° F. becoming more fluid at higher temperatures.

STABELAN HR disperses easily in dry preblends, solutions and dispersions.

STABELAN HR has been used with marked success in stabilizing all classes of organic and inorganic pigments — even delicate tints of hard-to-stabilize organic reds and maroons.

Write FOR COMPLETE TECHNICAL DATA

MANUFACTURED BY STABELAN CHEMICAL CO., TOLEDO, OHIO

HARWICK STANDARD CHEMICAL CO.

AKRON, OHIO

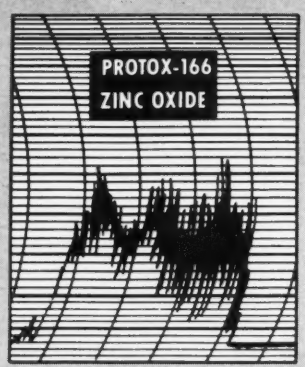
BRANCHES: BOSTON, TRENTON, CHICAGO, LOS ANGELES

Save on Power Costs Cut Mixing Time with . . .

PROTOX*
Zinc Oxides

POWER CONSUMPTION CHARTS OF BUNA-N MASTERBATCHES

Conventional zinc oxide resists wetting by Buna-N and other high-Mooney polymers.



Protox-166 definitely plasticizes Buna-N and provides easier-processing stocks.

These wattmeter records, made on our laboratory Banbury, show how Protox oxides cut power costs of zinc masterbatching and shorten mixing time as compared with conventional oxides:

1. Protox oxides eliminate Banbury power peaks. Rubber's affinity for the coated Protox surfaces does away with power surges—thus cutting penalty payments for electricity beyond the contract demand limit.

2. Protox oxides use less power per batch. Their patented coating of zinc propionate plasticizes the rubber . . . makes mixing easier.

3. Protox oxides shorten mixing time. They have fewer aggregates . . . the latter are dispersed by our exclusive process——treatment with propionic acid.

These are only a few of the ways you save processing dollars with Protox oxides. It will pay you to take in a trial order now and count up all the advantages of Protox under your particular conditions.

*U. S. Patents 2, 303, 329 and 2, 303, 330

THE NEW JERSEY ZINC COMPANY

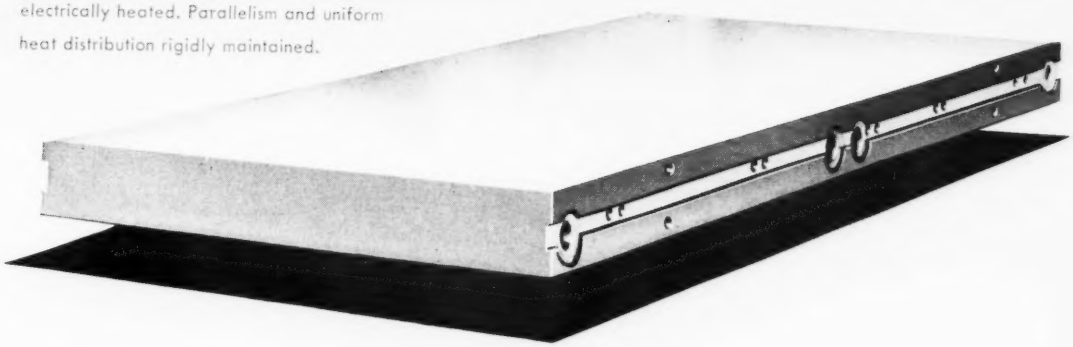
Producers of Horse Head Zinc Pigments

. . . most used by rubber manufacturers since 1852

160 Front Street, New York 38, N. Y.

HORSE HEAD PRODUCTS

Precision platens either steam or electrically heated. Parallelism and uniform heat distribution rigidly maintained.



R.D. Wood Heating Platens

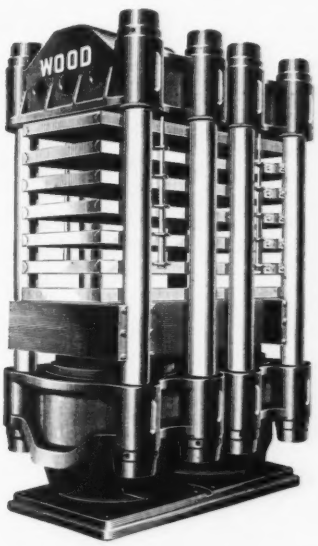
Long experienced in the design and manufacture of press heating platens, R. D. Wood Company supplies units in every practical size for every practical application.

These rolled steel heating platens meet the most exacting requirements in the processing of all types of rubber and plastics, the manufacture of plywood, veneers, wallboard, hardboard, pressed woods, and various types of composition flooring.

Write for descriptive literature.

Multiple-platen, 3675-ton hydraulic press for hardboard production.

Multiple-platen, 1327-ton hydraulic press for manufacture of molded brake lining and similar products.



150th anniversary

R. D. WOOD COMPANY

PUBLIC LEDGER BUILDING, PHILADELPHIA 5, PA.

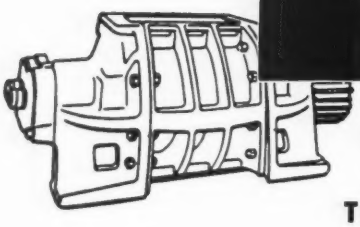
HYDRAULIC PRESSES AND VALVES FOR EVERY PURPOSE • ACCUMULATORS • ALLEVIATORS • INTENSIFIERS

Wire Your Reservation NOW

SAVE VITAL PRODUCTION TIME WITH

Specialized

BANBURY REBUILDING SERVICE

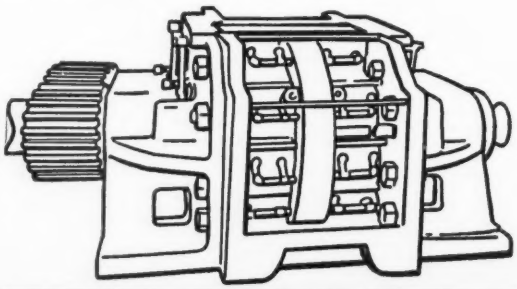


9 Safe Sure Steps . .

That Guarantee Your Mixer Body Will Be Restored To Full Efficiency

INTERSTATE REBUILDING SERVICE offers you two options: You can use our "PRE-PLAN" method to have your present body rebuilt and returned to you—or you can INTERCHANGE your old mixer body for one of ours, already completely rebuilt. Either way YOU SAVE valuable weeks of production time. Our facilities handle every size of Banbury, and we can fabricate any of the parts for any type.

It costs you nothing to have the details—and an estimate. It might mean production savings in the thousands.



SERVING THE RUBBER INDUSTRY

EXCLUSIVE SPECIALISTS IN BANBURY MIXER REBUILDING

INTERSTATE WELDING SERVICE

Main Offices – Metropolitan Bldg., AKRON 8, OHIO Phone JE-7970

From Coal to Plasticizer

in 299 yards!

WHEN only a few hundred yards separate your raw materials from your finished product, you're *really* basic! That's exactly the way we produce Pittsburgh PX Plasticizers . . . in a basic and integrated operation from coke ovens, through coal chemical and phthalic anhydride plants to final shipment from our modern new plasticizer plant.

The result? Quality-controlled production every step of the way, and a broad family of thirteen plasticizers with the high standards of purity, water-whiteness and stability you want. There's a good chance our engineers will be able to help you achieve better, more efficient production at your plant. Why not call or write us about it, *today!*

PITTSBURGH PX PLASTICIZERS

PX-104 DiButyl Phthalate
PX-108 DiIsoOctyl Phthalate
PX-109 DiNonyl Phthalate
PX-138 DiOctyl Phthalate
PX-158 DiCapryl Phthalate
PX-208 DiIsoOctyl Adipate
PX-209 DiNonyl Adipate
PX-238 DiOctyl Adipate
PX-404 DiButyl Sebacate
PX-408 DiIsoOctyl Sebacate
PX-438 DiOctyl Sebacate
PX-658 TetraHydroFurfuryl Oleate
PX-917 TriCresyl Phosphate

W&D 4646

PLASTICIZER DIVISION
PITTSBURGH
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Grant Building . Pittsburgh 19, Pa.

COAL CHEMICALS • AGRICULTURAL CHEMICALS • FINE CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

WHERE RUGGED PERFORMANCE COUNTS

TY·PLY

the RUBBER-to-METAL ADHESIVE for Bonded Rubber Tank Treads

Bonding tank-tread pads with TY-PLY is a time-proven procedure for obtaining maximum performance under the most severe conditions. Easy to use, versatile and dependable, TY-PLYs are ready-to-use bonding agents which do not require further formulating or heating by the customer.

TY-PLY **Q** or **3640** for bonding Natural, GR-S, and Butyl

TY-PLY **S** for bonding Neoprene

TY-PLY **BN** for bonding N-types

TY-PLY will adhere most vulcanizable rubber compounds to almost any clean metal surface

WRITE US TODAY on your specific bonding problems

Marbon

MARBON CORP.

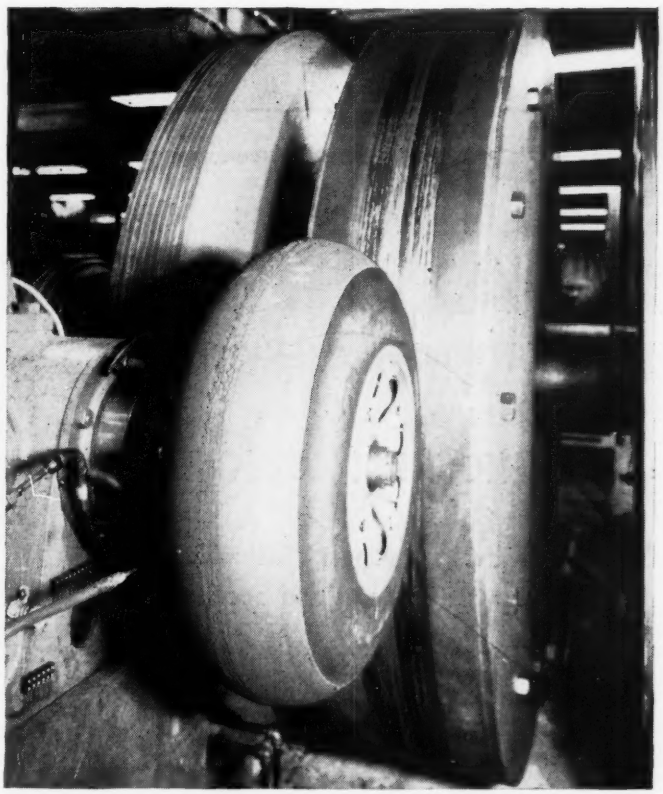
GARY, INDIANA

SUBSIDIARY OF BORG-WARNER

TY-PLY has stood the test of time . . . since '39

BRAKES FOR
—SUPERSONIC-SPEEDERS—

... PRE-TESTED THE WORLD OVER ON ADAMSON UNITED AIRCRAFT BRAKE AND TIRE-TESTING MACHINES



Striking examples of the versatility of Adamson engineering are the Brake and Tire-Testing Machines Adamson builds for the aircraft industry.

Simulating the landing of jet-propelled or other planes of practically any weight, at any given speed, they test the fitness of aircraft brakes and tires for use in actual service. A machine capable of testing the wheels and brakes of a 280-ton, jet-propelled job, landing at speeds above 250 miles an hour, is under construction.

Hydraulics, pneumatics, new and involved instrumentation and unusual control devices including radically new types of brakes for conducting fatigue tests on tires, and for regulating the speed of inertia wheels, are involved. Inertia wheels on some of the larger machines are 16 feet in diameter, weigh 185 tons, rotate at peripherial speeds of 200 miles an hour, and develop 212,000,000 foot-pounds of kinetic energy, yet are so accurately balanced that maximum machine vibration is held within .0005 and .001 of an inch.

As consultants to the U. S. Army Air Force, the U. S. Navy Air Force, the National Advisory Committee for Aeronautics, and to numerous aircraft manufacturers and brake equipment companies throughout the world, we have designed and/or built more machines of this type than all other manufacturers combined.

It may be that brake and tire-testing equipment will never be required in your operation, but keep in mind that Adamson's engineering abilities are available to design and build for you precision machinery not only for the aircraft industry or for the manufacture of rubber or plastics but for whatever may be your purpose.

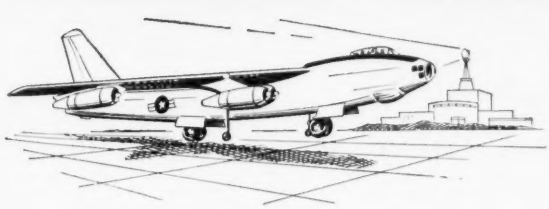
We invite you to consult us on your next project. You will not be obligated.

Adamson United Company

730 Carroll Street, Akron 4, Ohio

Sales Offices In Principal Cities

Subsidiary of United Engineering and Foundry Company
Plants at: Pittsburgh • Vandergrift • New Castle
Youngstown • Canton



Adamson United

AIRCRAFT BRAKE AND TIRE-TESTING MACHINES

SHARPLES XTRUDED ULTRA ACCELERATORS

THE 9 SERIES

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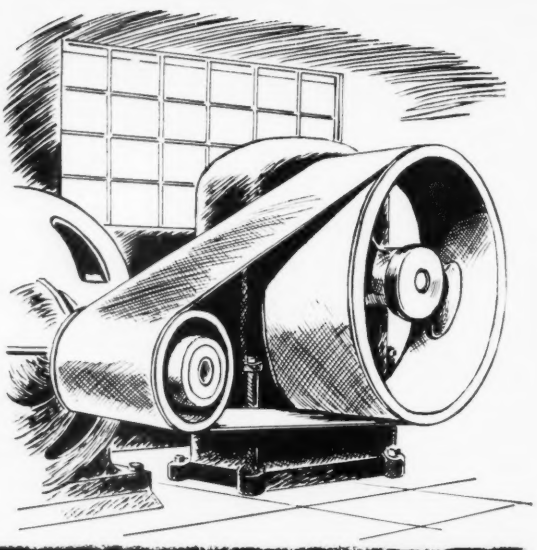

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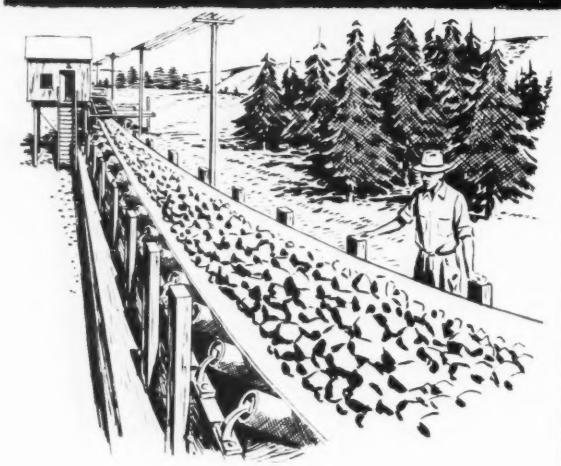

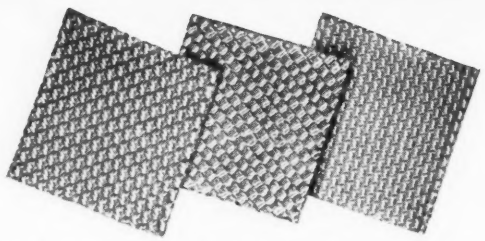

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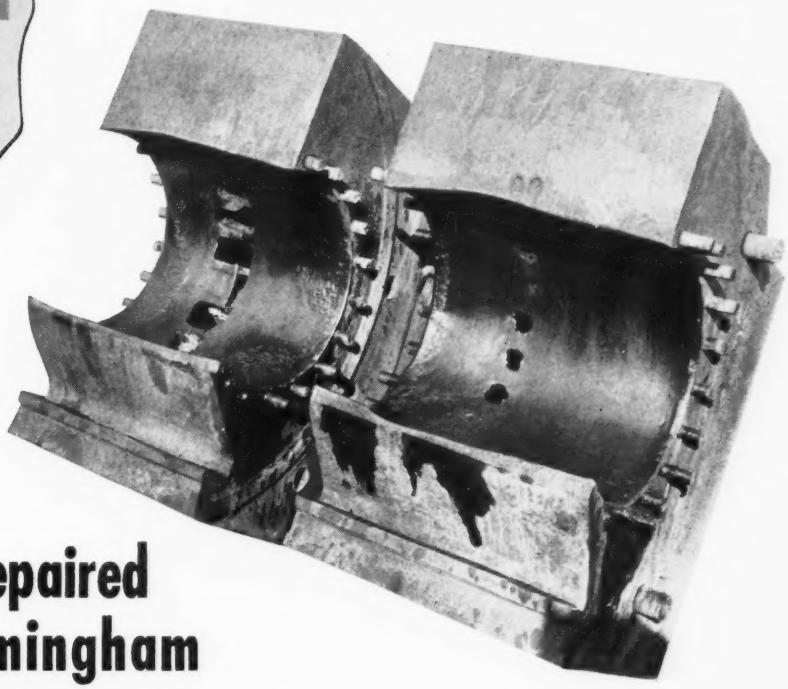

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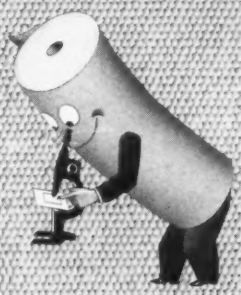

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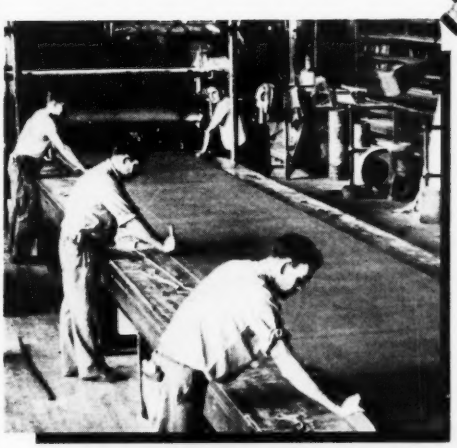

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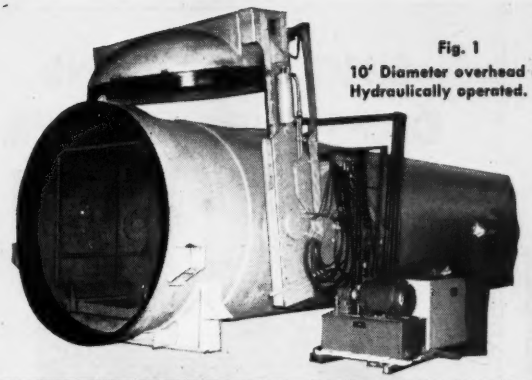

Fig. 1
10' Diameter overhead door.
Hydraulically operated.

Fig. 2
5' Diameter hinged door
for vertical vessel.

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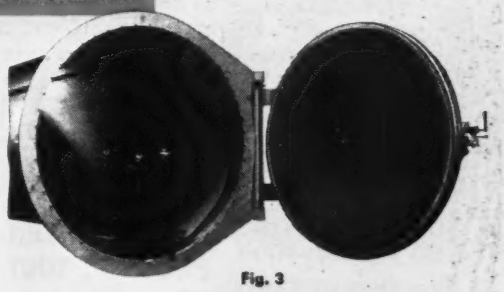

Fig. 3
12' Diameter hinged door
for horizontal vessel.

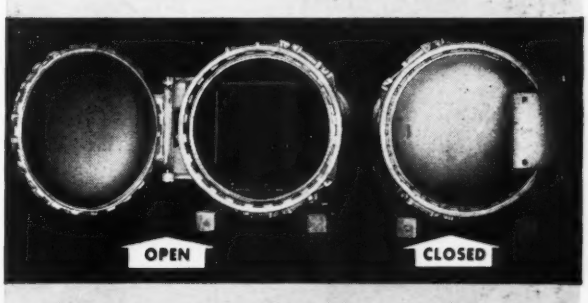

Fig. 4
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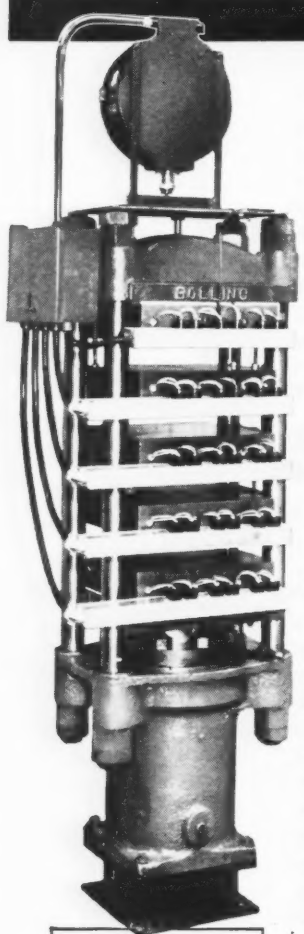

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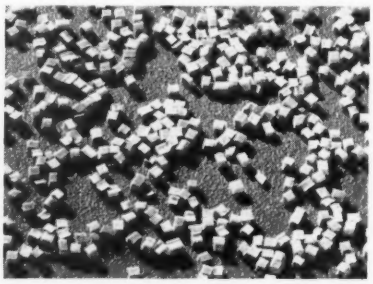
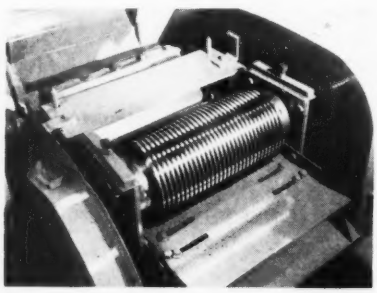


Pellets produced by cross cutting rubber sheet stock: a straight line continuous operation.



Rotary shears that cut rubber sheets into strips. Knife cylinder for cross cutting in background.

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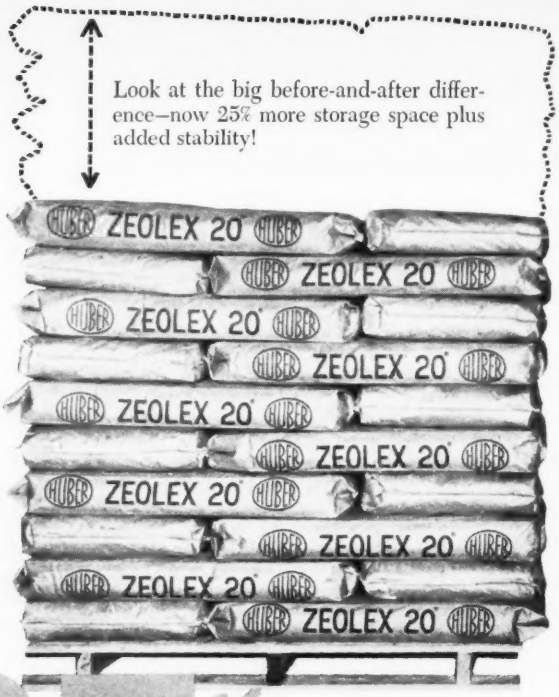

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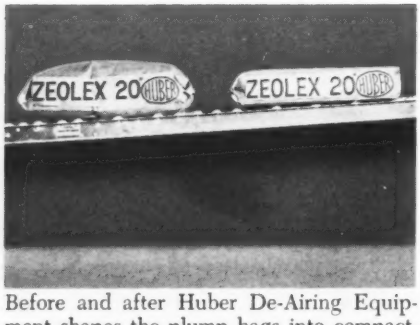

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A Bill Brothers Publication

MAY, 1953
Vol. 128—No. 2

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VOL. 128—NO. 2 MAY, 1953

A Study of the Goodrich Flexometer With Synthetic Polymer Compounds[1]

B. G. Labbe[2]

PUBLISHED articles relating to the effect of varying the test conditions for the Goodrich flexometer were based on tests with natural rubber compounds. The original article by Lessig[3] describes the apparatus, method of operation, and type of data obtained. The paper by Mackay, Gardner, and Anderson[4] provides data showing the effect on temperature rise of altering the frequency, applied load, and the deflection.

The purpose of this report is to show similar type of data for compounds of six synthetic polymers in addition to natural rubber, to obtain a comparison of the polymers under varying test conditions, and also to indicate a means of adjusting the test conditions so that better reproducibility may be obtained among the various laboratories.

The reputation of lack of reproducibility of data from the Goodrich flexometer should be attributed less to imperfections in the apparatus itself than to lack of proper care in the adjustment of the equipment, improper preparation of test samples, and the ready acceptance of the results for comparative purposes without data to show the effect on the results, caused by adjustments that are not precise.

Procedure

In order to cover the synthetic elastomer field rather comprehensively, the following polymers were selected for testing:

1. Natural rubber
2. GR-S-1000 (X-603)
3. GR-S-1500 (X-624)
4. Polybutadiene (122° F.) (XP-155)
5. Polybutadiene (41° F.) (XP-150)
6. 80/10/10 BD/I/S (XP-212)
7. Sodium-catalyzed 87.5/12.5 BD/S

The following compounding recipes were utilized:

	Natural Rubber	GR-S-1000 122° F.	GR-S-1500 41° F.	Poly BD 122° F.	Poly BD 41° F.	BD/I/S 80/10/10	Na-BD/S 75/25
Polymer	100	100	100	100	100	100	100
EPC black	40	40	40	40	40	40	40
Zinc oxide	5	5	5	5	5	5	5
Sulfur	3	2	2	2	2	2	2
Altax		1.75	3	3	3	3	1.25
Captax	0.5						
Stearic acid	2.0		1.5	1.5	1.5	1.5	3.0
PBNA	1.5						

Stress-strain data were obtained on vulcanizates cured for 25, 50, 75, 100, and 150 minutes at 292° F. Optimum cures were selected from the modulus *versus* time-of-cure curves. The hysteresis tests were conducted on optimum cured and 30-minute overcured samples. For natural rubber, three cures (25, 45, and 65 minutes) were evaluated because the optimum cure for this compound is usually high on the temperature rise *versus* time-of-cure curve.

The effect of loading during these tests with the Goodrich flexometer was studied by decreasing the load from the standard 143 lb/sq. in. to 115 and 90 lb/sq. in. Because most laboratories test at 212 and at 100° F., variations in applied load and deflection were made at each of these temperatures. Under standard conditions of load and deflection, tests were also made at 158° F.

The normal frequency of 1,800 flexures a minute was decreased to 1,500, 1,200, and 980 f.p.m., while the deflection of 17.5% on the one-inch sample was varied by testing also at deflections of 10 and 25%.

Since the Government Laboratory standard procedure for determining temperature rise is a 30-minute test, all tests in this program were run for a minimum of 30 minutes, except for those made with 25% deflection, in which instance a 10-minute test was made. If the temperature rise between the 20- and 30-minute readings was greater than 2° F., the test was continued until the rise reached equilibrium (i.e., temperature rise of 2° F., or less during a period of 10 minutes). At 100° F. most test specimens reach equilibrium temperature in 10 to 15 minutes.

Discussion

The effects of the several variables are individually discussed. Hysteresis temperature rise values obtained at overcures are used for graphical presentation of the data since the temperature rise for the optimum cure, selected from the 300% modulus values, usually falls on the steep part of the hysteresis *versus* time-of-cure curves.

[1] The work disussed herein was performed as a part of the research project sponsored by the Reconstruction Finance Corp., Office of Synthetic Rubber, in connection with the Government Synthetic Rubber Program.
[2] Government Laboratories, University of Akron, Akron, O.
[3] *Ind. Eng. Chem.*, Dec. 15, 1937, p. 582.
[4] *Rubber Chem. Tech.*, Apr., 1941, p. 421.

TABLE 1. EFFECT OF TESTING TEMPERATURES

(Load, 143 Lb./Sq. In.; Throw, 17.5%; and Frequency, 1800 F.P.M.)

Test Temp., °F.	Min. Cured at 292° F.	Shore A Hardness	Initial Comp., % 100	Initial Comp., % 158	Initial Comp., % 212	30-Min. Temp. Rise, °F. 100	30-Min. Temp. Rise, °F. 158	30-Min. Temp. Rise, °F. 212	Set, % 100	Set, % 158	Set, % 212
Natural rubber*	25	52	25.3	27.1	25.1	57	57	63	11.8	29.0	†42.4
	45	56	20.9	21.8	20.1	42	35	39	4.4	12.3	†37.0
	65	59	20.7	21.0	18.6	41	33	33	4.6	8.5	22.3
GR-S-1000	65	63	20.5	21.8	20.7	82	65	55	8.0	11.3	15.4
	95	64	17.9	18.9	18.8	71	58	46	5.0	6.0	8.8
GR-S-1500	55	61	18.6	18.4	19.0	65	56	45	5.3	8.9	14.2
	85	63	16.2	17.0	16.5	58	46	39	2.4	4.6	7.4
Polybutadiene (122° F.)	50	58	23.6	21.8	21.0	63	53	48	6.0	11.8	16.5
	80	60	21.6	21.0	17.3	65	52	40	4.5	7.5	9.5
(41° F.)	50	64	15.1	14.9	13.6	60	49	39	2.7	5.9	8.6
	80	65	14.8	14.8	15.1	54	47	37	2.8	3.9	6.7
BD I S 80/10/10	80	62	15.4	17.6	15.9	56	50	38	2.6	4.5	7.1
	100	63	15.4	16.5	16.1	57	47	38	2.3	3.3	5.1
BD S 75/25 (Na-catalyzed)	55	59	24.6	24.7	25.0	69	53	40	8.2	12.3	19.3
	85	61	21.7	21.6	20.0	55	43	29	4.6	6.0	11.2

*Cured at 280° F.
†Test exceeded 30 minutes.

TABLE 2. EFFECT OF FREQUENCY

(Load, 143 Lb./Sq. In.; Test Temp., 212° F.; Throw, 17.5%)

Frequency, Flexures per Min.:	Min. Cured at 292° F.	Shore A Hardness	Initial Comp., % 980	Initial Comp., % 1200	Initial Comp., % 1500	Initial Comp., % 1800	30-Min. Temp. Rise, °F. 980	30-Min. Temp. Rise, °F. 1200	30-Min. Temp. Rise, °F. 1500	30-Min. Temp. Rise, °F. 1800	Set, % 980	Set, % 1200	Set, % 1500	Set, % 1800
Natural rubber*	25	53	27.2	26.1	22.9	25.1	29	39	57	63	†27.6	†33.3	....	†42.4
	45	57	21.7	21.5	21.7	20.1	16	22	32	39	14.3	16.4	23.1	†37.0
	65	60	20.5	19.9	19.4	18.6	14	18	27	33	11.9	11.7	13.1	22.3
GR-S-1000	65	63	22.6	22.3	22.0	20.7	28	37	47	55	10.0	12.2	13.5	15.4
	95	65	19.4	19.4	19.4	18.8	26	33	42	46	6.5	7.6	9.0	8.8
GR-S-1500	55	63	18.0	18.5	18.8	19.0	24	30	38	45	7.8	9.7	12.0	14.2
	85	64	16.0	15.7	16.0	16.5	20	25	32	39	4.5	4.8	5.9	7.4
Polybutadiene (122° F.)	50	61	21.9	21.8	21.1	21.0	24	31	40	48	11.9	13.4	15.0	16.5
	80	64	19.3	20.4	18.8	17.3	22	29	33	40	6.9	8.6	9.4	9.5
(41° F.)	50	65	14.7	14.8	14.9	13.6	22	28	32	39	6.2	6.5	8.6	8.6
	80	67	13.4	13.6	12.7	15.1	18	26	31	37	4.2	4.3	4.6	6.7
BD I S 80/10/10	80	64	15.7	14.4	16.3	15.9	19	27	33	38	4.9	5.6	6.3	7.1
	100	65	16.5	15.5	16.3	16.1	20	25	32	38	3.7	4.3	4.7	5.1
BD S 75/15 (Na-catalyzed)	55	59	25.4	23.7	25.0	25.0	25	29	37	40	14.9	16.2	17.9	19.3
	85	61	22.8	21.8	22.2	20.0	16	20	25	29	8.1	9.3	10.2	11.2

*Cured at 280° F.
†Test exceeded 30 minutes.

Effect of Test Temperature

From the data in Table 1 and the plotted values of the overcures in Figure 1, it appears that the temperature rise of the synthetic polymer compounds tested *versus* the test temperature is a straight-line function, within the limits tested. Of the six synthetic compounds, the temperature rise values of three, at 100, 158, and 212° F., describe straight lines; while for the other three compounds the data in Table 1 indicate a break in the line at 158° F. From a practical viewpoint the reproducibility of data from the hysterimeter is definitely not better than 2° F. Since by changing the 158° F. values by 2° F. or less, plotted values for the synthetic polymers fall on straight lines, it appears reasonable to assume that all synthetic polymer compounds would do likewise. The curve for the overcured natural rubber compound decreased in hysteresis, as the temperature of test was increased from 100 to 158° F., and then remained constant. Hysteresis data for the stocks of natural rubber cured at 25 and 45 minutes show that the effect of the test temperature on the heat rise is not the same for the three cures. With the synthetic, however, the temperature rise for the different cures were straight-line functions (curves not shown) of the test temperatures, within the limits used, but the slopes were not necessarily similar for the different cures of the same polymer.

Straight lines, in Figure 1, plotted from the temperature rise values for the overcures *versus* increased testing temperature were essentially parallel for the cured stocks of GR-S-1000, 122° F. polybutadiene, and the sodium-catalyzed polymer. The lines representing temperature rise for the stocks of the overcures of GR-S-1500, 41° F. polybutadiene, and the butadiene/isoprene/styrene polymer are approximately parallel, but the maximum difference in temperature rise of about 18° between 100 and 212° F. for the stocks of these three polymers is less than the rise of about 25° F. for the other three synthetic polymer compounds at the overcure. As the state of cure, as has been shown, may or may not affect the slope of the curves, these differences in slopes are not considered representative of the polymers, but merely fortuitous. These limited test results, however, do raise the question as to the validity of interpreting them to show temperature rise in tires at much higher operating temperatures.

The set values increased with increase in testing temperature, but not in direct proportion to the temperature (Figure 2). Generally, the increase in set values between 158 and 212° F. was greater than that between 100 and 158° F., but the state of cure, as well as the type of polymer, seems to affect the change in set with increase in temperature within the range shown. This raises some question as to the desirability of comparing hysteresis properties at equal set values as these latter may change in a variable manner with increases in temperature depending on the state of cure.

An error of 10° F. in testing temperature would cause an error of about 2° F. in temperature rise when vulcanizates of synthetic rubber compounds are being tested.

Effect of Frequency

The effect of varying the frequency of strokes at a testing temperature of 212° F. is shown by the data in Table 2 and illustrated by the plots in Figures 3 and 4. A decrease in frequency causes a decrease in temperature rise values. The temperature rise is essentially a straight-line function of the frequency within the limits tested. The limited data shown in Table 2 indicate that with increase in cure, the hysteresis increase with increases in frequency

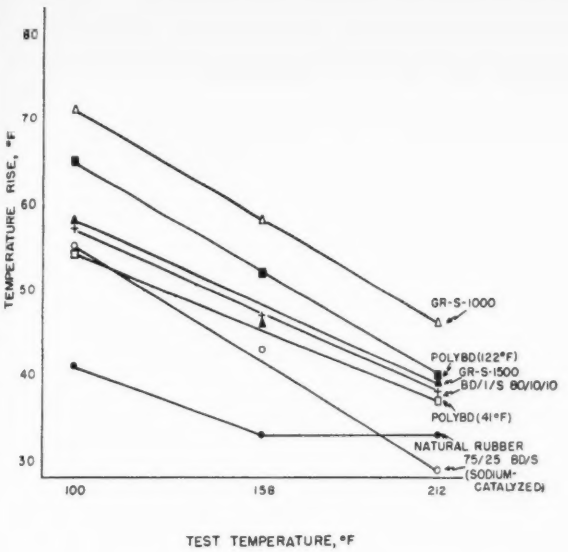


Fig. 1. Effect of Test Temperature on Temperature Rise

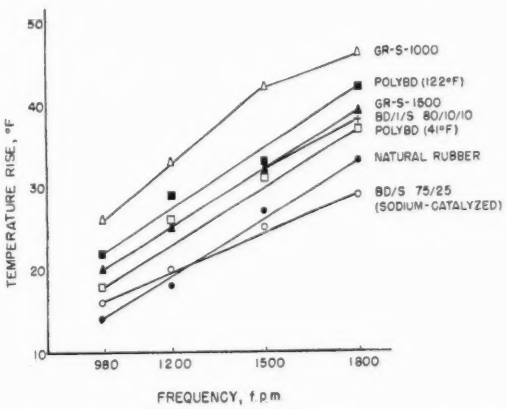


Fig. 3. Effect of Frequency on Temperature Rise (Test Temperature 212° F.)

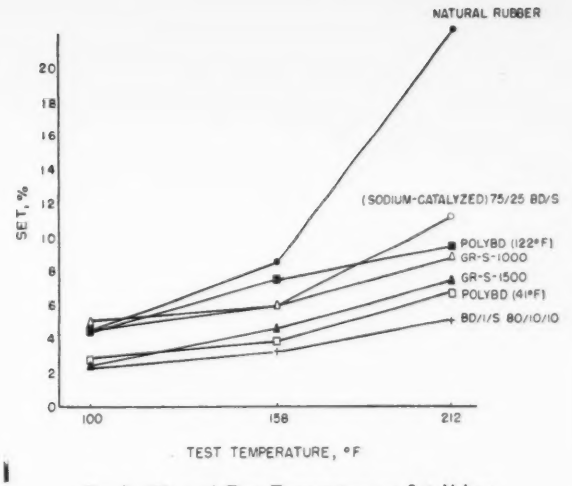


Fig. 2. Effect of Test Temperature on Set Values

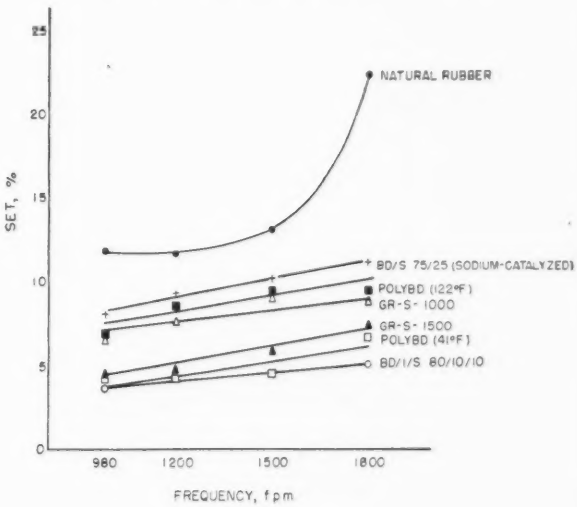


Fig. 4. Effect of Frequency on Set (Test Temperature, 212° F.)

becomes less. That is, the slope of the curve becomes less. Therefore any comparison of the rate of change with frequency is dependent more on the state of cure than on the type of polymer. The temperature rise of natural rubber and the five synthetic polymer compounds increased by 18° to 20° F. over the range in frequency of 980 to 1,800 flexures a minute, i.e., a rate of about 2° F. per 100 f.p.m. for the overcures. The rise in the case of the Na copolymer compound was about 1.5° F. per 100 f.p.m.

As compounded, the natural rubber stocks increased in set markedly with increase in frequency. From the data in Table 2, it can be seen that the synthetic polymers at either cure increased in set linearly with the frequency, and the slope decreased with an increase in state of cure.

For the natural rubber compound at the overcure shown in Figure 3 the change in set values is small (1.2%) between 980 and 1,500 f.p.m.; but, from 1,500 to 1,800 f.p.m. the set increased by 9.2 percentage units.

Effect of Deflection

Test Temperature, 212° F.

The effect of throw or deflection on the hysteresis-temperature rise of the test specimen during the period of cyclic compression was investigated at both 100 and 212° F. The data obtained at a testing temperature of 212° F. are shown in Table 3. When the deflection was increased to 25% of the original height of the specimen (instead of the standard, 17.5%), the test samples failed before the end of the 30-minute period because of the severity of the stroke. To obtain a comparison of hysteresis-temperature rise values of the various compounds, it was therefore necessary to use the data obtained for the 10-minute test at 212° F. (Figure 5). The set values are for specimens tested at 30 minutes and consequently do not coincide with the temperature rise values.

An increase in the deflection or throw causes an increase in hysteresis greater than a first-order response for the states of cure examined (Figure 5). Decrease in the state of cure caused a greater increase in hysteresis with increase in the per cent. deflection. At 17.5% throw, an error of one percentage unit in deflection will cause a difference of about 3° to 4° F. in the temperature rise at a test temperature of 212° F. at the cures shown.

Test Temperature, 100° F.

At a test temperature of 100° F. similar variations in percentage deflection were made; 30-minute temperature rise values were obtained for five of the seven polymer compounds (data in Table 4, plotted in Figure 6). With an increase in deflection, the rise is greater in 30 minutes at 100° F. than in 10 minutes at 212° F., and an error of

TABLE 3. EFFECT OF VARYING DEFLECTION

(Load, 143 Lb./Sq. In.; Test Temperature, 212° F.; Frequency, 1,800 F.P.M.)

	Min. Cured at 292° F.	Shore A Hardness	Initial Comp., %: 10.0	17.5	25	10-Min. Temp. Rise, °F.: 10.0	17.5	25	Set, %: 10.0	17.5	25
Natural rubber*	25	52	27.9	25.1	27.8	10	32	106	23.5	....	....
	45	57	22.0	20.1	20.7	6	23	69	11.9	....	....
	65	59	19.7	18.6	20.3	3	20	63	9.2	....	....
GR-S-1000	65	63	21.0	20.7	22.7	16	47	101	5.9	15.4	....
	95	65	19.5	18.8	20.4	14	37	87	3.9	8.8	....
GR-S-1500	55	62	18.4	19.0	18.9	13	38	78	5.7	14.2	....
	85	64	16.1	16.5	15.6	10	35	64	3.2	7.4	....
Polybutadiene (122° F.)	50	59	20.6	21.0	20.4	11	40	77	8.4	16.5	....
	80	61	19.6	17.3	19.1	11	34	72	5.4	9.5	....
(41° F.)	50	65	15.3	13.6	13.8	10	36	54	4.5	8.6	....
	80	66	13.5	15.1	13.1	10	34	†	2.4	6.7	....
BD/I/S 80/10/10	80	62	18.7	15.9	15.1	11	33	68	3.2	7.1	....
	100	62	16.3	16.1	15.1	11	35	54	2.9	5.1	....
BD/S 75/25 (Na-catalyzed)	55	61	25.9	25.0	25.6	11	34	70	10.2	19.3	....
	85	62	21.4	20.0	21.8	7	25	59	5.6	11.2	....

*Cured at 280° F.

†The specimens slipped from between the anvils at four and seven minutes; the temperature rise values were 26 and 31° F., respectively.

TABLE 4. EFFECT OF VARYING DEFLECTION

(Load, 143 Lb./Sq. In.; Test Temperature, 100° F.; Frequency, 1800 F.P.M.)

	Min. Cured at 292° F.	Shore A Hardness	Initial Comp., %: 10.0	17.5	25.0	30-Min. Temp. Rise, °F.: 10.0	17.5	25.0	Set, %: 10.0	17.5	25.0
Natural rubber*	25	53	26.9	25.3	25.4	27	57	145	2.5	11.8	34.5
	45	57	22.4	20.9	21.8	22	42	88	1.4	4.4	†24.9
	65	60	20.6	20.7	19.2	16	41	82	1.5	4.6	†23.9
GR-S-1000	65	62	21.0	20.5	22.7	42	82	139	3.0	8.0	19.7
	95	64	19.4	17.9	18.6	37	71	123	1.7	5.0	11.0
GR-S-1500	55	62	19.8	18.6	18.9	33	65	112	1.8	5.3	13.8
	85	64	16.6	16.2	17.7	29	58	97	1.1	2.4	7.4
Polybutadiene (122° F.)	50	59	21.5	23.6	22.6	30	63	121	2.3	6.0	18.1
	80	60	20.5	21.6	22.7	30	65	88	1.3	4.5	11.6
(41° F.)	50	65	15.4	15.1	15.1	29	60	‡62	1.4	2.7	4.2
	80	66	14.1	14.8	14.1	28	54	§81	0.8	2.8	1.0
BD/I/S 80/10/10	80	63	17.4	15.4	16.3	30	56	104	1.2	2.6	6.2
	100	63	16.8	15.4	16.3	29	57	x98	1.4	2.3	3.9
BD/S 75/25 (Na-catalyzed)	55	59	23.8	24.6	24.9	34	69	112	2.8	8.2	20.0
	85	61	22.6	21.7	19.9	30	55	91	2.8	4.6	....

*Cured at 280° F.
†Test exceeded 30 minutes.
‡Seven-minute test.
§Eight-minute test.
xTwenty-minute test.

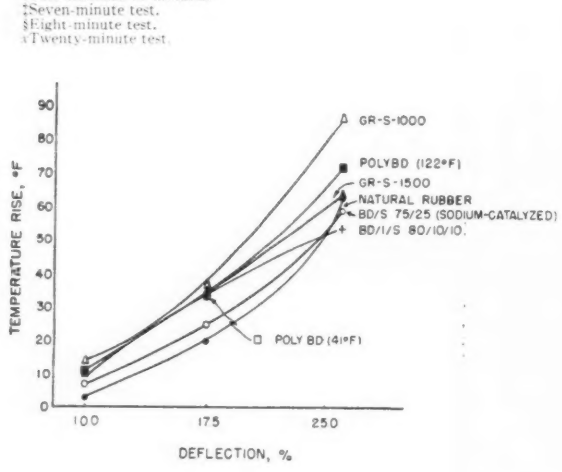


Fig. 5. Effect of Deflection on Temperature Rise (Test Temperature, 212° F. 10-Minute Test)

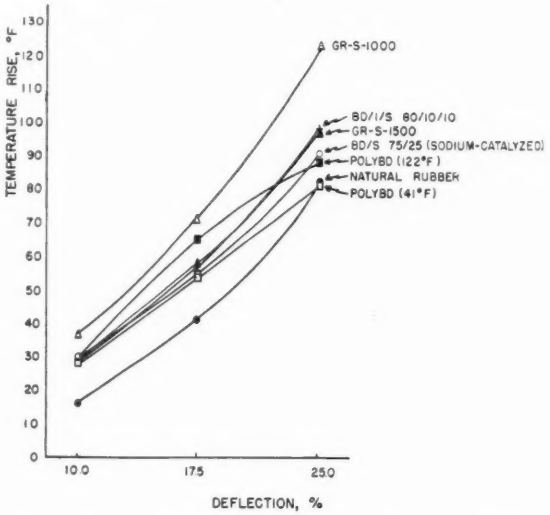


Fig. 6. Effect of Deflection on Temperature Rise (Test Temperature, 100° F.)

one percentage unit in deflection will cause a difference of about 5° to 6° F. It is noted that, regardless of testing temperature, compounds mixed according to a tread type recipe should not be tested at a deflection of greater than 17.5% because of the increase in slope beyond this deflection at 100° F.

The reputation of the Goodrich flexometer for reproducibility has undoubtedly been impaired by the failure to set the throw on the eccentric of the machine at the proper distance from the center to obtain a deflection of exactly 17.5%. The vernier provided is not very accurate, and this adjustment should be made by means of a dial gage calibrated to 0.001-inch. The gage should be clamped to the upper frame with the foot of the gage resting on the cross-bar supporting the upper anvil. Some of these details are explained in "ASTM Standards on Rubber Products."[5]

Effect of Load

The results obtained by varying the load are listed in Table 5, and the effects of load on temperature rise and set are shown in Figure 7 and 8. It is noted that a change

[5] Dec., 1952, edition, p. 334. American Society for Testing Materials, Philadelphia, Pa.

TABLE 5. EFFECT OF APPLIED LOAD

(Throw, 17.5%; Test Temp., 212° F.; and Frequency, 1,800 F.P.M.)

	Load, Lb./Sq. In.: Min. Cured at 292° F.	Shore A Hardness	Initial Comp., % 90	115	143	30-Min. Temp. Rise, °F. 90	115	143	Set, % 90	115	143
Natura rubber*	25	53	19.6	24.7	25.1	44	82	†63	38.9	44.8	‡42.4
	45	57	15.3	19.0	20.1	26	30	§39	15.3	†32.6	‡37.0
	65	61	14.5	17.2	18.6	25	27	x33	11.3	†21.5	22.3
GR-S-1000	65	65	16.1	19.2	20.7	46	46	55	9.5	12.4	15.4
	95	65	15.4	18.1	18.8	41	41	46	6.2	8.4	8.8
GR-S-1500	55	63	13.3	16.7	19.0	37	36	45	7.9	10.3	14.2
	85	65	11.0	14.0	16.5	34	32	39	4.4	5.8	7.4
Polybutadiene (122° F.)	50	60	15.2	18.1	21.0	37	37	48	10.0	12.8	16.5
	80	62	15.2	16.8	17.3	35	35	40	6.9	9.2	9.5
(41° F.)	50	66	10.4	12.1	13.6	33	38	39	5.5	6.9	8.6
	80	67	0.92	12.4	15.1	29	34	37	3.3	4.6	6.7
BD/I/S 80/10/10	80	63	11.4	14.7	15.9	32	33	38	3.6	5.8	7.1
	100	63	11.0	14.5	16.1	34	31	38	3.5	5.2	5.1
BD/S 75/25 (Na-catalyzed)	55	61	19.1	21.7	25.0	31	35	40	12.9	15.7	19.3
	85	61	15.8	19.8	20.0	26	25	29	7.5	9.5	11.3

*Cured at 280° F.
†Tested 46 minutes, temperature rise 92° F.
‡Test exceeded 30 minutes.
§Tested 66 minutes, temperature rise 85° F.
xTested 80 minutes, temperature rise 77° F.

TABLE 6. EFFECT OF APPLIED LOAD

(Throw, 17.5%; Test Temp., 100° F.; and Frequency, 1,800 F.P.M.)

	Load, Lb./Sq. In.: Min. Cured at 292° F.	Shore A Hardness	Initial Comp., % 90	115	143	30-Min. Temp. Rise, F. 90	115	143	Set, % 90	115	143
Natural rubber*	25	53	19.9	22.8	25.3	45	55	57	5.6	9.1	11.8
	45	56	14.9	18.1	20.9	39	42	42	2.7	3.1	4.4
	65	59	14.5	16.1	20.7	38	42	41	2.4	3.9	4.6
GR-S-1000	65	62	15.1	18.5	20.5	72	79	82	4.3	7.7	8.0
	95	64	12.9	17.6	17.9	67	72	71	2.1	3.4	5.0
GR-S-1500	55	61	13.9	16.7	18.6	64	67	65	3.0	3.6	5.3
	85	64	12.1	15.1	16.2	54	62	58	1.6	2.1	2.4
Polybutadiene (122° F.)	50	59	16.0	18.6	23.6	59	64	63	3.2	5.2	6.0
	80	61	14.9	18.5	21.6	59	64	65	2.9	4.0	4.5
(41° F.)	50	64	10.5	12.8	15.1	50	60	60	1.8	2.2	2.7
	80	65	9.7	12.9	14.8	47	58	54	1.4	1.3	2.8
BD/I/S 80/10/10	80	63	12.6	15.1	15.4	56	59	56	1.8	2.4	2.6
	100	63	11.8	14.7	15.4	53	60	57	1.1	1.8	2.3
BD/S 75/25 (Na-catalyzed)	55	58	15.9	20.4	24.6	51	63	69	3.6	5.7	8.2
	85	61	15.0	18.3	21.7	51	57	55	2.0	2.6	4.6

*Cured at 280° F.

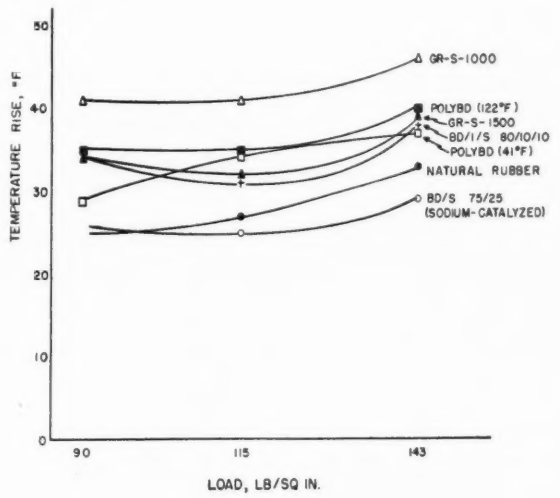


Fig. 7. Effect of Load on Temperature Rise (Test Temperature, 212° F.)

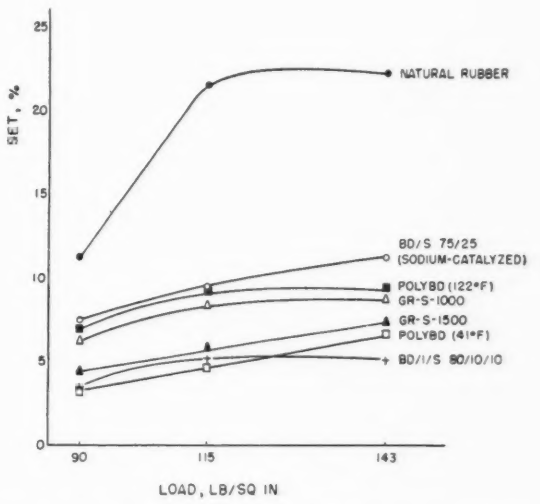


Fig. 8. Effect of Load on Set Values (Test Temperature, 212° F.)

in load has less effect on the temperature rise than any other test condition tried (i.e., temperature, frequency or throw), and again an increase in state of cure has caused less effect on results with respect to the variations in test conditions. It appears from these data that an error of 5 lb/sq. in. load would not make more than 1° F. difference in temperature rise at the cure levels shown. In view of the calibration, wherein the balance bar is leveled and a known actual weight is applied, it is not logical to assume that an error greater than 5 lb/sq. in. would be made.

The variation in set values with a change in load is also very small, except for the compound of natural rubber, as shown in Figure 8.

Varying the applied load at a test temperature of 100° F. causes an anomaly not apparent from the tests at 212° F. (Table 6, Figures 9 and 10). Six of the seven compounds had higher hysteresis-temperature rise with a 115 lb/sq. in. load than with a 143 lb/sq. in. load. A difference of 4° to 5° F. in temperature rise over the entire load range of 90 to 143 lb/sq. in. was observed for compounds of GR-S-1000, 122° F. polybutadiene, and nat-

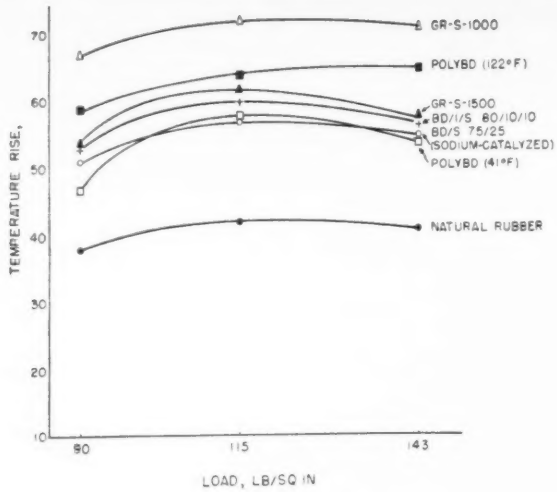


Fig. 9. Effect of Load on Temperature Rise (Test Temperature, 100° F.)

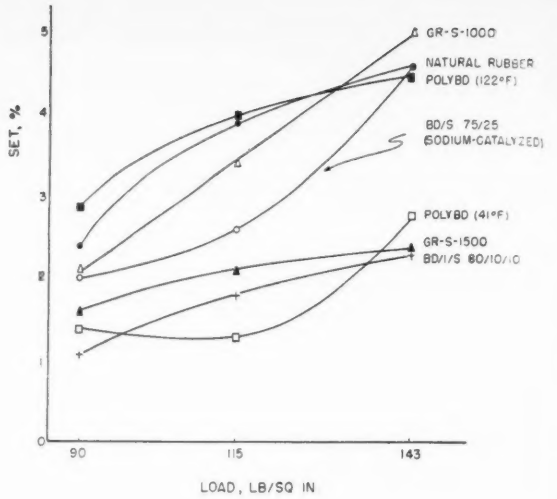


Fig. 10. Effect of Load on Set Values (Test Temperature, 100° F.)

ural rubber. With the other polymer compounds the increase in the rise with an increase in load of from 90 to 115 lb./sq. in. was 6° to 11° F., but, in every case, the rise decreased between 115 to 143 lb./sq. in.

The set values increase slightly as the applied load is increased.

Conclusions

The relation between the testing temperature (100, 158, and 212° F.) and the hysteresis-temperature rise of the synthetic polymers at the cures used was found to behave as a linear function. The slopes of the lines seem to indicate that the relative order of efficiency of the vulcanizates varies at different temperatures of test and cure levels.

Frequency variations at 212° F. ranged from 980 to 1,800 flexures a minute. The temperature rise is a linear function of the frequency for all compounds tested. The increase in temperature rise with an increased rate of flexing is approximately uniform for all compounds (about 2° F. per 100 f. p. m.) at the cure levels studied. The state of cure is shown to influence the rate of change of the temperature rise with the change in frequency.

The relation of the degree of deflection to the temperature rise characteristics of the rubber samples at 100 and 212° F. was studied at 10, 17.5, and 25% deflections. An error of deflection of one percentage unit will cause a 3° to 4° F. error in the 10-minute temperature rise value. As the state of cure or the test temperature decreases, the error in the temperature rise increases.

A change in load has less effect on the temperature rise and set values than any of the other test conditions investigated.

Most of the lack of reproducibility among laboratories is probably due to failure to adjust precisely the throw (deflection of the specimen) of the test apparatus which is being used.

Letter to the Editor

United Baltic Corp., Ltd.
21 Mincing Lane and Great Tower St.
London E. C. 3, England

10th March, 1953

The Editor
India Rubber World
386 Fourth Avenue
New York 16, N. Y.

Dear Sir,

I would like to refer to the article in your January issue, "A Survey on Dirt Content of Natural Rubber," commenting on an excellent paper on this subject in the I.N.I.R.O.'s communication No. 84 I-IV.

In the matter of cleanliness of natural rubber it is generally agreed that there is wide scope for improvement, and any progress which can be achieved in this field will undoubtedly help to increase the chances of natural in its competition with synthetic rubber, but in this connection the question arises, what is the realistic value of improved cleanliness of natural rubber to the consumer?

From the replies received from manufacturers in response to I.N.I.R.O.'s enquiries, it appears that the grades manufacturers can use depend upon the class of goods for which they are intended. The finest and cleanest rubber is required for surgical goods; while the lower grades of rubber can be used for the manufacture of articles in which the presence of dirt in varying degrees is of secondary importance.

It is significant that the replies also indicate that many consumers of raw rubber do not yet know what is really the best grade to buy for their particular purpose, and that many consumers have hitherto not given this question sufficient attention.

Some indication of what the U. S. A. tire manufacturers can and are actually using is given in a recent private estimate which shows the following percentages:

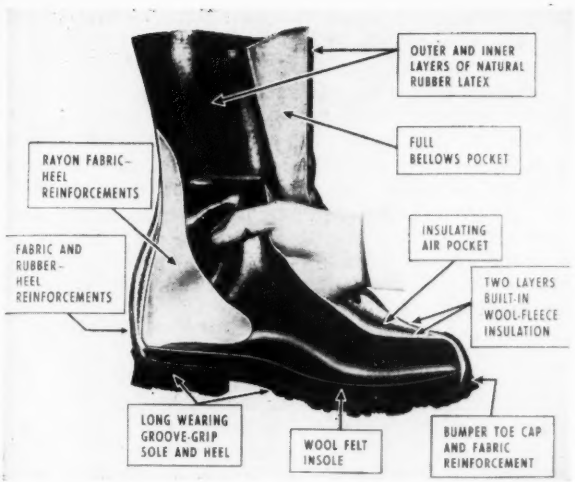
No. 1 R.S.S. Pale Crepe and Liquid Latex	2%
2 R.S.S.	5%
3 R.S.S.	15%
4 R.S.S.	21%
5 R.S.S.	8%
Nos. 2 & 3 Amber—B & C	
No. 1 & No. 2 Rem. Thin Brown	25%
4 Amber and No. 3 Rem. Thin Brown	10%
Smoked Blankets	9%
Flat Bark	5%
	100%

(Continued on page 205)

Recent Developments in

Footwear—1952

B. H. Capen[1]



Hood Rubber Co. Civilian Low-Temperature Boot; Insulation from Cold Attained by Sealed-in Dead-Air Space That Surrounds Foot Completely Well above Ankle

CONTINUED mild winters that have been experienced both in the Midwest and in the densely populated cities of the East Coast have again caused the demand for waterproof footwear to fall off to a very great extent. The bulk of the sales has been of heavy goods and those types of footwear worn by children and young people.

The dipped latex and plastic foot covering which were introduced in 1949 have become a factor in the waterproof footwear industry and are replacing some of the lightweight earlier models of rubber footwear. About 10% of the waterproof footwear sold in 1952 was of this type. While this type footwear was originally introduced by people outside the industry, many of the regular manufacturers of waterproof footwear have introduced it in their own lines in 1952.

To help offset the loss of demand occasioned by the mild winter weather and the use of lightweight dipped latex and plastic footwear, style and fashion have been emphasized by the waterproof footwear manufacturers. Protection from water and trimness are no longer sufficient buying inducements today; women are demanding dramatic colors, novel designs, and different fabrics, more than ever before. The industry profits by this situation, however, since such models quickly go out of style, and replacement sales are increased.

The cold weather waterproof shoe which has been made in large quantities for the Armed Services has in turn created styles and designs for civilian wear; one of these utilizes a sponge innersole for moderately cold temperatures, and the other replaces this sponge innersole with an insulating sock when protection against sub-zero temperatures is desired.

Along with this cold weather shoe, another manufacturer has placed on the market a shoe made from plastic with an insulating sponge lining, from which excellent results have been obtained. This shoe should have good civilian acceptance and be widely used next season.

The dress shoes introduced last season,[2] which use some of the new synthetic fibers as uppers and are trimmed with fur or shearling, have continued to be well received and will again be a factor in women's wear.

A more casual type of shoe, introduced primarily to be in the same price field as the dipped latex shoe, is a shoe utilizing a rubberized print cloth as the upper part, but with a conventional sole. This model should do very well since it can be made with some variation as to color, novelty fabrics, and style that women demand.

All manufacturers of waterproof footwear have been active in defense work, particularly in the manufacture of the arctic boot,[2] and there have been more or less normal production and demand for the regular four- and five-buckle overshoes and heavy-duty rubbers.

Tennis shoes continue in considerable demand. The styles and types of tennis shoes have not changed much except that probably more of the casual type were made than in previous years. One trend of note has been the fact that demand for tennis shoes is no longer seasonal as it has been in the past. There have also appeared some casual shoes with a cushion-crepe sole, which should continue in good demand in the higher price field.

The manufacturer of waterproof and tennis-type footwear was afforded some relief when the government restrictions on the use of rubber were lifted in April, 1952. Much development work is being done by the synthetic rubber producers to provide a suitable polymer for the footwear manufacturer so that in the case of an emergency the industry could continue to make suitable products for both the Armed Services and the civilian users.

Physics of Rubber

S. D. Gehman[3]

PROGRESS and development were clearly apparent during the past year in most of the lines of endeavor associated with physics in the rubber industry. A maturing of scientific efforts could be seen in many instances where the fundamental work of previous years has estab-

[1] Technical superintendent, Tyer Rubber Co., Andover, Mass.
[2] India Rubber World, Apr. 1952, p. 73.
[3] Goodyear Research Laboratory, Akron, O.

FOR the past several years India RUBBER WORLD has been publishing a series of short articles on recent developments in the various branches of the rubber industry and its technology. These articles are contributed by the members of our Editorial Advisory Board or persons selected by them and appear during the first six months of the year. Some of the articles covering the year 1952 are presented herewith. EDITOR.

lished points of contact with technology so that a closer integration with related fields has become possible. Thus the domain of physics in the industry now has indistinct boundaries and exists with a very fluid borderland merging into chemistry, technology, and engineering.

Spectographics Methods

The liaison of physics and chemistry is shown, for instance, by the establishment of physical methods for many of the most difficult and exacting problems of chemical analysis and identification in connection with rubber compounds, polymers, and rubber chemicals. The infrared absorption methods for identification of polymers and molecular structures in polymers has been widely used for several years. The growth of the infrared fingerprinting method for chemicals into a comprehensive punched-card index system should now result in its greatly increased use for analytical work with rubber chemicals. An especially important development for the analysis of rubber compounds is the combination of infrared and ultra-violet absorption identifications with chromatographic methods of separation, a very powerful analytical combination indeed (1).[4] Further research work with spectrographic procedures will undoubtedly continue to open up new opportunities for their application. Several contributions appeared which display the usefulness of infrared methods for studying the ozone and oxygen attack of rubber (2).

There may be a glimmer that the mass spectrometer is finally rising above the horizon for rubber research in a report describing an isotope dilution method for determining the oxygen content of rubber (3). This highly developed, but still quite expensive instrument has many unrealized potentialities for rubber research which should materialize as mass spectrometers come into more general use.

It is instructive to observe how fundamental concepts of rubber structure and modulus nurtured in basic research exerted a controlling influence on such a practical program as that for the technical classification of natural rubber according to its rate of cure. The theory of rubber structure relating modulus to the density of molecular cross-links made the physical measurement of the 100% modulus value for natural rubber gum stocks a much more logical criterion of the state of cure than any chemical determination. The immediate background of work which was the basis for the scheme adopted for the technical classification program has now been published in a series of papers which add considerably to the knowledge of the significance of the determination of state of cure (4).

Dynamic Properties

The dynamic properties of rubber and polymers continued to occupy the attention of a considerable number of research workers concerned with the extension of a generalized mathematical theory to describe the relation of dynamic modulus and loss factor over extended ranges of temperature and frequency. Advances were made in broadening the mathematical procedures to include "static" viscoelastic phenomena and also possibly dielectric phenomena. The work has not reached the point as yet where it gives much insight into the actual molecular mechanisms or details of molecular structure responsible for the assumed relaxation distributions, although this may be considered an ultimate goal.

Several intriguing arrangements for carrying out dynamic measurements appeared (5) showing that the creative possibilities for such equipment are by no means exhausted. There is reason to believe that the extensive research on dynamic properties in recent years is receiving more attention by rubber technologists concerned with rubber in vibration so that dynamic modulus and resilience values may begin to enter into the specifications of rubber mountings in cases where it is important to control them closely.

Abrasion and Reinforcement

The puzzles connected with the mechanism of rubber abrasion and rubber reinforcement by carbon black are of continuous interest to physicists working with rubber, as shown by a number of valuable fundamental studies on these subjects which were released in the past year. The effects with reinforcing carbon blacks are undoubtedly associated with "bound rubber," that is, a gelling effect of the carbon black on the polymer. But there is still frustration in looking for an entirely unique mechanism for carbon black reinforcement since "bound rubber" has been shown to occur also with other pigments, but to a lesser extent (6). This clue may be valuable for developing the reinforcing properties of such pigments.

Radioactive Isotopes

It might be expected that the impact of atomic physics would be apparent in the widespread use of radioactive isotopes for securing new information on the many aspects of the physics and chemistry of rubber for which they should be applicable. But this has not been the case. Although a few investigations using radioactive isotopes in rubber research have been published, their routine employment in rubber laboratories has not developed. The hazard and the expense involved in using isotopes in the factory, except for such well-designed purposes as thickness gages, makes their limitations there readily understandable. Opportunities for using them in the laboratory, however, should probably be more widely considered. The addition of S35 to the sulfur in a rubber compound, for instance, makes possible a very elegant and rapid method for determining combined sulfur.

Ultrasonic Waves

Descriptions were made available last year of two installations for the inspection of tires by ultrasonic waves (7), a procedure which should be of value for special purposes. It is always fascinating to note the spilling over of developments in physics into rubber research and technology. A case in point is the increased adaptation of electronic techniques to various types of rubber testing and research equipment and production devices. The full utilization for such purposes of the remarkable electronic developments now on hand promises to be a very fruitful field in which only a start has been made. There is opportunity here for the modernization of many of the traditional mechanical ways of handling rubber and of measuring and controlling the properties of rubber and rubber products.

[4] Numbers in parentheses refer to Bibliography items at end of this section.

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Industrial Rubber Products

B. H. Capen

DURING the year 1952 the manufacturer of industrial or mechanical rubber products operated at a very high level with virtually all plants busy in both civilian and defense work. The industry forecast for 1953 is that mechanical rubber goods, including industrial types of belting and hose, will share the high level of demand predicted for the rest of the rubber industry. Lighter mechanical goods, such as molded and extruded products, show production gains based on increasing demands from manufacturers of automobiles, trucks, washing machines, refrigerators, radios, television sets, vacuum cleaners, and literally hundreds of other items.

The usual natural and synthetic rubber polymers have been used, with the compounder able to meet the exacting requirements of both the Armed Services and the civilian consumer. Blends of nitrile rubbers and phenolic resins have provided improved impact strength, better resistance to vibration fatigue, improved thermal shock resistance, wear and chemical resistance, and have offered numerous possibilities for compression and transfer molding.

With the controls on the production of automobiles lifted, the demand for automotive rubber products should provide an excellent volume of business in 1953, though competition between suppliers may be extremely keen.

Extensive work is being done in the rubber industry to improve the ozone resistance of its products. This work involves improved methods of measuring ozone aging as well as means of extending the life of rubber goods exposed to this type of aging, both of which are particularly important to the manufacturers of automotive rubber products.

A new polymer introduced in 1952, chlorosulfonated polyethylene, called Hypalon,[7] may prove of great value to the industry. The use of this material is more or less in the initial stages of development at this time.

The silicone rubbers continue to be of importance, particularly where high and low temperature service conditions must be met. A new hydrophobic silica filler[8] has been developed which greatly improves the tensile strength of silicone rubbers.

Synthetic rubbers are replacing natural rubber in many products where the service requirements can be more easily met by a certain type of synthetic rubber or blends of these rubbers. In addition, existing polymers are being improved, and more new and improved polymers are being offered each year. The high styrene copolymers continue to be especially suitable for hard rubber products where high impact resistance is desired.

Molding techniques have not changed materially although refinements of standard practices have been developed. The transfer molding technique is being used more each year because of the improved precision obtained with this method.

Several new methods of metal adhesion have been introduced, and the use of this type fabrication continues to grow in importance in the industry. There is, however, no easy solution to metal adhesion problems—each and every problem must be solved more or less as a new one.

Many of the difficulties which have been a part of the daily life of the rubber goods manufacturer were eliminated with the relaxation of controls in the Rubber Order M-2 in April, 1952. Actually, with the numerous polymers and techniques available to him in increasing numbers in recent years, the rubber technologist has been able to solve most of the problems presented to him.

Reclaimed Rubber—1952

J. M. Ball[5]

IN DECEMBER, 1952, the consumption of reclaimed rubber increased over that for November to a greater degree than the consumption of new rubber. This situation was very likely due to the fact that the price of off-grade natural rubbers continued to advance in December. There is no way of escaping the effect of price.

Comparison of consumption statistics between 1952 and 1951 yields little information of value since 1951 was an abnormal year in rubber consumption. Comparison with 1950 is more revealing because the total new rubber consumption then was almost identical with that in 1952, and only the latter part of 1950 may be said to have been abnormal.

The table which appears on the following page illustrates the point:

[5] Midwest Rubber Reclaiming Co., East St. Louis, Ill.
[7] India RUBBER WORLD, Apr., 1952, p. 86; Oct., 1952, p. 87; Feb., 1953, p. 659; Mar., 1953, p. 791; Apr., 1953, p. 54.
[8] *Ibid.*, Oct. 1952, p. 88, "Compounding of Silicone Rubber II." Abstract of Rubber Division, A. C. S., paper by Spencer, Davis, and Kilbourne, Connecticut Hard Rubber Co., and Montermoso, Office of Quartermaster General.

Year	Reclaim Consumption, Long Tons	Consumption Ratio Reclaim/Total New Rubber, %	Price Ratio No. 1 RSS ÷ GR-S/Reclaim
1950	303,100	24.1	3.7
1951	346,100	28.6	4.0
1952	280,500	22.2	3.0

The lower price ratio in 1952 points naturally to a lower consumption ratio. Reclaimed as well as natural rubber must compete with government-made synthetic.

In transportation items, i.e., tires, tubes, and camelback, the relative consumption of reclaimed to total new rubber was almost identical with that of 1950, although the relative GR-S consumption was much higher in 1952.

In non-transportation items reclaim suffered somewhat in comparison with 1950, undoubtedly because of competition from GR-S. In other words, any loss in the position of reclaimed rubber in 1952 has been in the non-transportation items.

The production of GR-S oil masterbatches and oil-black masterbatches more than doubled in 1952, as compared with 1951 output. The ratio in 1952 to total GR-S produced was about 12% on a gross weight basis, or about 9% on a GR-S content basis. This material, of course, makes added competition for reclaim, as the price is below that of standard grades of GR-S, which are figured at 23¢ a pound in calculating the price ratios above.

Nevertheless, the reclaimed rubber industry in 1952 operated at more than 90% of capacity on a five-day-a-week basis. The annual capacity on a seven-day-week basis is about 420,000 long tons.

During the year representatives from the reclaiming industry received a hearing before a U. S. Senate committee in Washington to discuss competition from the government-owned synthetic rubber industry, whose pricing policy is based on a cost system which omits certain elements of cost normally embraced by private industry.

In June, 1952, the President's Materials Policy Commission issued its report, generally known as the Paley Report. Chapter 20[6] of this report has the following to say about reclaimed rubber:

"The growing volume of all rubber in use, and the high possible rate of recovery, provide a very high potential for production of reclaimed rubber. The competitive advantages and supply conditions of natural and synthetic rubber, as to both qualities and prices, have in the past kept reclaimed rubber below its potential level. Relatively greater reclaimed rubber production may be expected in the future, and it is projected to supply about 800,000 long tons by 1975, compared with 313,000 in 1950."

There has been no major changes in the technology of rubber reclaiming in 1952, but the industry is definitely in a new cycle of development. Seventy-five years ago reclaiming was largely a matter of heating finely ground fabric-free scrap in pans with suitable oils, and today the industry is reconsidering these early first principles in the light of modern methods. The obstacles which Marks so cleverly overcame by his patent of 1899 no longer exist, and the digester process *may* be slowly declining in importance. Another type of change now taking place involves improvements in the mechanics of mixing and handling in the mill room.

A breakdown of government figures for reclaimed rubber consumption by end products for the first 10 months of 1952 shows that transportation items, i.e., tires, tubes, and repair materials, took 53%. Beyond that one breakdown are no official figures, but unofficial estimates show that the other big reclaim consuming items are automobile mats and other automotive goods, mechanical goods, automotive hard rubber battery containers and other hard rubber products, followed by heels and soles, footwear, solvent cements and water dispersions, and miscellaneous items.

The reclaimed rubber industry is doing well, but is like the natural rubber industry in one respect: it needs new uses for its product, and new products at lower costs.

Soles and Heels

THE 1952 production of shoes in the United States of more than 500 million pairs has been reached only twice in the history of the shoe industry. Shoe protion of this magnitude contributed largely to the steady volume of rubber sole and heel production such as was experienced last year.

There were no outstanding innovations or spectacular developments in the rubber sole and heel industry during 1952. The use and the general acceptance of other than leather for shoe bottoms showed a slight increase over 1951 data, reaching a high percentage of approximately 55% of all shoes manufactured, in spite of a substantial drop in the price of leather in the Spring of 1952. Lower leather prices resulted in an appreciable curtailment in the production of elastomer-resin insoles, and to a lesser extent, in the production of elastomer-resin and composition outsoles.

The year 1952 witnessed a considerable increase in the production of cellular crepe soles, which was a logical development following the introduction of this type of crepe sole in the previous year. The comfort, light weight, and long life of this sole contributed to its increasingly wide popularity and acceptance and directed industry-wide research and development toward the incorporation of cellular-type construction in other types of composition soles.

Activity in the shoe repair field during 1952 was about on a par with that in 1951, but because of somewhat lower prices, dollar volume fell off during 1952, although unit volume was just about equal to the 1951 figure.

The steady increase in the use of materials other than leather in the manufacture of shoes has stimulated a considerable reaction in the leather and tanning industries. An age-long complacency has been replaced by an aggressive counterattack, including a large research and development program accompanied by a strong advertising and merchandising program advocating the advantages of "genuine leather." More intense competition between leather and substitute material interests may be expected.

Shoe manufacturers are aware of the need of stimulating the sale of shoes in order to assure continued volume production in that industry. Efforts are being made to "secure just a little more of the family budget," by the development of types of shoes to fit specific working conditions and to push the sale of summer shoes to go with "that lightweight summer suit." Success in these efforts will mean more volume of business for the rubber sole and heel industry.

It is felt generally that 1953 will be another good shoe production year, which in turn will assure a good volume of production in the sole and heel industry. Contemplated new developments in the rubber sole and heel industry, if successful, should provide the added possibility of a profitable and successful 1953.

[6] See India Rubber World, July, 1952, p. 502.

Methods Employed in Compounding Research—VII[1]

Ingredients for Compounding Research

I. Drogin [2]

THE following installment continues the section on ingredients for compounding research which was begun in our December, 1952, issue. Part I of this series appeared in our October, 1952, issue.

Special Synthetic Rubbers

In addition to the polymers already listed, reference should be made to specialty synthetic rubbers which may prove helpful in compounding research problems. Special synthetic rubbers, as pointed out by Tuley (129), are part of a group of chemical products for the rubber industry experiencing the greatest technological development. They are enabling the rubber industry to build performance characteristics and qualities into its products and new applications never possible with only natural rubber. They are also leading the rubber industry technically into the plastics industry because some of these synthetic rubbers are capable of being blended with certain plastics to form new compositions with unique properties of practical importance. The following polymers will be described: Arctic rubbers, acrylic rubbers, Alfin rubbers, silicones, Hypalon, Nitrazole CF type GR-S, Teflon, Vulcollans, and privately produced butadiene-styrene synthetic rubbers.

Arctic Rubbers

In the past few years there has been some demand for industrial usage and an insistent demand from the military services for synthetic rubbers that will function properly under service conditions at extreme low temperatures, —65° F. or even to —100° F. In the course of preparing naval vessels to maneuver in the Arctic, the problem has arisen of providing rubber gaskets which recover rapidly from compression at temperatures as low as —35° F. During far north military maneuvers in 1946, vehicles frequently were immobilized because the flattened part of the tire on the ground would take a permanent set when parked overnight. In the morning such tires would not roll until they were thawed out and made round again. Rubber tires, hose, gaskets, and belting in the past have frozen as hard as rock at temperatures below —60° F.

Polymers and copolymers made at low temperatures (41° F.) have, according to Meyer (130), improved tensile strength and cut-growth resistance when compared with 122° F. polymers. It was originally considered that such low-temperature polymers would be most suitable for Arctic applications requiring, at the same time, good physical properties at normal temperatures. Regular GR-S is generally satisfactory for application to recover rapidly from compression at temperatures as low as —35° F., because its vulcanizates do not crystallize or undergo second-order transition at —35° F. As shown by Morris, Hollister, and Shew (131), butadiene-styrene copolymers containing less combined styrene than regular GR-S or GR-S-10 and possibly prepared at a lower polymerization temperature than these rubbers are a better choice for use in manufacturing gaskets for low-temperature service. Thus reduced styrene content is beneficial in a copolymer for this application. In general, it is of importance that copolymers for low-temperature applications require less styrene than GR-S, 8.7 to 16.0%, copolymerized at 86 to 122° F.

Polymer flexibility at low temperatures decreases because of visco-elastic (second-order transition phenomena), but also through crystallization effects in the case of polymers having a structure of sufficient regularity. When evaluating elastomers for their usefulness at low temperatures, both effects must be taken into account. GR-S, according to Morris and Hollister (132), does not crystallize appreciably, but its hardness and stiffness increase and its resilience decreases as its temperature is lowered. Butadiene polymers showed no evidence of structural regularity until so-called cold rubber with less than about 15% styrene content was produced.

In 1949, Firestone Tire & Rubber Co. announced (133) a new rubber with exceptional resiliency for Arctic use—a 90/10 butadiene/octyl decyl methacrylate polymerized at 59° F., later prepared as XP-197 by the RFC—which made possible the solution of innumerable problems in the operation of machinery, motor vehicles, and aircraft at sub-zero Arctic temperatures. In comparison with GR-S and natural rubber, this Arctic polymer has, it is claimed, two outstanding advantages in tires tested under extreme sub-zero laboratory conditions. The tires do not stiffen so much that they develop permanent flat spots when parked, and treads do not harden and chip out; and they will be resilient enough to remain serviceable at temperatures as low as —75° F. GR-S and natural rubber become brittle (134) at temperatures of —61° F. or lower and allow pieces to chip out. Mileage tests of Arctic rubber tires indicate the rate of wear to be very satisfactory under normal highway driving conditions.

The properties of three commercially available GR-S type of Arctic polymers are presented by Rodde (135). The rubbers discussed are: GR-S 1015 (formerly X-489, 95/5 butadiene-styrene, 122° F. and emulsified with rosin acid soap); GR-S 1505 (formerly X-600, 90/10 butadiene-styrene, 41° F. and emulsified with rosin acid soap), and GR-S 1504 (formerly X-601, 90/10 butadiene-styrene, 41° F. and emulsified with fatty acid soap). GR-S 1015 (X-489) has been used singly in applica-

[1] Based on a paper presented before the Ontario Rubber Section, C. I. C., Toronto, Ont., Canada, Mar. 11, 1952; The Los Angeles Rubber Group, Inc., Los Angeles, Calif., Apr. 1, 1952; and the Northern California Rubber Group, San Francisco, Calif., Apr. 10, 1952.

[2] Director of research, United Carbon Co., Charleston, W. Va.

[3] Numbers in parentheses refer to Bibliography items at the end of this installment.

tions where low temperature serviceability was of prime importance as well as in blends with other diene-type polymers to achieve the desired balance between low-temperature characteristics and general physical properties. Type X-489 is recommended where physical properties at room temperature are not of prime consideration, but where extremely good low-temperature flexibility is required. The presence of five parts of styrene imparts improved processing properties to such a copolymer compared with polybutadiene of equivalent Mooney viscosity. GR-S 1505 (X-600) is somewhat inferior to GR-S 1015 (X-489) with respect to low-temperature flexibility, but notably superior with regard to stress-strain properties and has been used successfully in mechanical goods, transportation items, coated fabrics, and the like. GR-S 1504 (X-601) was developed specifically for use in insulation and jacketing compounds for wire and cable manufactured for low-temperature service. It is coagulated by a process designed to yield a polymer of low water-soluble ash content. GR-S 1505 and 1504 are recommended especially for applications requiring fairly good low-temperature properties combined with physical properties approximately equal to those of GR-S-10 at room temperature. The fatty acid soap polymer (GR-S 1504) is recommended for best extrusion and calendering properties. An Arctic polymer, GR-S 1503, containing 13% styrene, rather than 23.5%, is, according to Schatzel (136), used for applications for defense purposes in the neighborhood of —60° C.

A terpolymer J-2943 (80/10/10 butadiene-styrene-isoprene, made at 41° F. and emulsified with rosin acid soap) has, according to Meyer (130), very good low-temperature characteristics, since the presence of styrene and isoprene breaks up the tendency to crystallize on storage at low temperature. This terpolymer also has good physical properties at normal temperatures. Blends of polymers, especially X-489 with other polymers, may be used to obtain a range of low-temperature and normal-temperature properties.

A butadiene-acrylonitrile copolymer containing about 20% acrylonitrile has been found to have satisfactory low-temperature properties and good oil and solvent resistance. Paracril 18-80 is in general use in O-ring seals for the oil, fuel, and hydraulic systems of military aircraft.

Copolymers of butadiene with various acrylic esters have been made. The balance between low-temperature and normal-temperature properties is poorer in the case of such polymers, as compared with butadiene-styrene copolymers. Methacrylate esters copolymerized with butadiene have slightly poorer low-temperature properties at the same ester content than the acrylate esters (130). A 90/10 butadiene-octylmethacrylate copolymer made at 59° F. was found to have TR 70 (70% retraction of the original sample) of —35° C., which is about equal to that of a 90/10 butadiene/styrene, 86° F. copolymer, but tensile is somewhat poorer for the methacrylate copolymer. Copolymers of butadiene with vinyl pyridine have shown only slight advantage in balance of low-temperature flexibility and properties at normal temperature. Three commercial-type polymers, Paracril 18-80, Butaprene NF, and Neoprene Type FR,[4] have, according to Clark and Dennis (137), been found suitable for many applications involving both low-temperature flexibility and oil resistance.

In shipboard low-temperature service the physical properties most significant are, as pointed out by Lichtman and Chatten (138), as follows: flexibility, or the magnitude of stress required to produce an observed degree of deformation; compression set, including rate and amount of dimensional recovery of a material after being held under constant deformation; and brittleness, a structural failure of a material under rapid deformation. The significance of these properties may vary from one application to another; each specification thus requires the evaluation of the property or properties pertinent to the service performance of the material.

An interesting study of various low-temperature test procedures is reported by Helin and Labbe (139). The tests covered were temperature-retraction, low-temperature extrusion, Gehman low-temperature flexibility, compression set, Clash-Berg torsion test, British Admiralty hardness test, stress-relaxation test, Shore A hardness, and rate of retraction. The retraction test gives a temperature index that correlates with the ultimate stiffness of elastomer vulcanizates at low temperatures. The polymers tested were natural rubber, GR-S X-539 (122° F.), emulsion polybutadiene (122° F.) (XP-148), emulsion polybutadiene (14° F.) (XP-169), sodium catalyzed polybutadiene, sodium catalyzed 75/25 butadiene/styrene, Perbunan 26, emulsion 85/15 butadiene/styrene (122° F.) and emulsion 80/8/12 butadiene/isoprene/styrene (41° F.).

The work by Morris, Hollister, and Mallard (140) and Morris, Hollister, and Barrett (141), has established that the cold compression set correlates with the sealing ability of a gasket at low temperatures.

The formulation of low-temperature resistant stocks such as those used in rubber tires, gaskets, hose, belting, and rubberized fabrics requires care. It will depend on the application: (1) low-temperature flexibility, and (2) flexibility and oil resistance. As pointed out by Clark and Dennis (137), the literature on compounding oil-resistant rubbers for low-temperature service considers a variety of subjects, such as the effect of base polymer, plasticizer, carbon black, and vulcanizing system on flexibility, oil resistance, and other physical properties. Efforts to improve one physical property have invariably resulted in a loss in at least one other. This point is particularly well demonstrated in studies on the effect of type of polymer on low-temperature flexibility. Improvements made in the low-temperature flexibility of butadiene-acrylonitrile copolymers by increasing the ratio of butadiene have resulted in a loss of oil resistance.

It has also been found that polymers which have good low-temperature properties obtain this property at a sacrifice of tensile strength. Starting with a butadiene-acrylonitrile copolymer high in acrylonitrile, low-temperature flexibility may be obtained by adding relatively large amounts of plasticizer, but other physical properties are compromised. Moreover gains made in low-temperature flexibility are often temporary, because when highly plasticized compositions are immersed in oil or gasoline, the plasticizer may be lost.

Ester plasticizers reduce stiffness and hardness and are superior to the hydrocarbon types for low-temperature flexibility. A small proportion of hydrocarbon type with ester plasticizers is useful for optimum processing of the raw elastomer and for cured physical properties. The octyl esters of phosphoric, azelaic, and sebacic acids are examples of good commercial plasticizers. Phthalate esters are considerably poorer. Molecular weight above 300 is desirable to limit volatile losses. The best plasticizers for reducing the cold compression set of GR-S at —35° F., and of low volatility and low extractability with water, were selected by Morris and Hollister (132) from a total of 181 listed substances and found to be esters of long-chain dibasic acids and of phosphoric acid: namely, di-2-ethyl hexyl adipate, azelate, and phosphate; di-butoxyethyl adipate; di-2-ethyl butyl azelate; di-N-octyl

[4] No longer available as such. Neoprene GNA with plasticizer used now.

phosphate; and dihexyl, dicapryl, dioctyl, and diisoctyl sebacate.

Carbon blacks, according to Gehman, Woodford, and Wilkinson (142), and Greene and Loughborough (143), impair low temperature flexibility. This condition appears logical, since stocks which contain carbon black are harder and stiffer at normal temperatures and would be expected to show greater stiffness at low temperatures. Working with Paracril 18-80 stocks, Clark and Dennis (137) found that the higher the carbon black content, the higher the hardness, and the poorer the low temperature flexibility. In highly loaded stocks of equal hardness, carbon blacks of fine particle size produced increased stiffening at low temperatures. In stocks of equal hardness MT, SRF, and MAF (FEF) blacks were best, HAF black intermediate, and EPC black poorest in low temperature flexibility. The addition of both plasticizer and carbon black tended to improve low-temperature flexibility. This improvement fell off with hardness and became negligible at a hardness of about 85 durometer.

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(137) "Compounding Acrylonitrile-Type Rubber for Low-Temperature Flexibility." *Ind. Eng. Chem.*, Mar., 1951, p. 771.

(138) "Physical Properties of Natural and Synthetic Rubber Materials at Low Temperatures." *Anal. Chem.*, May, 1952, p. 812.

(139) "A Study of Various Low-Temperature Test Procedures." India RUBBER WORLD, May, 1952, p. 227; June, 1952, p. 365.

(140) "The Cold Compression Sets of Natural and Synthetic Vulcanizates." *Ibid.*, July, 1945, p. 455.

(141) "Cold Compression Set of Elastomer Vulcanizates. *Ind. Eng. Chem.*, 42, 8, 1581 (1950).

(142) "Low Temperature Characteristics of Elastomers." *Ibid.*, Sept., 1947, p. 1108.

(143) "Some Physical Properties of Elastomers at Low Temperature." *Rubber Chem. Tech.*, 18, 587 (1945).

(To be continued)

Witcarb RC

WITCO CHEMICAL CO., 260 Madison Ave., New York 16, N. Y., has announced the addition of Witcarb RC to its line of Witcarb calcium carbonates for use in the rubber industry. The new material is coated to inhibit dusting, but this coating does not retard cure, it is reported. Ultrafine granulation to a particle size of 0.065-micron is said to permit easy dispersion of the substance without requiring special handling. Advantages claimed to be gained by the usage of this new product include lowered costs, improved quality, and elimination of masterbatching. Witcarb RC has a brightness value of 100.5;[1] its other properties are essentially the same as those for the uncoated Witcarb. The coated type is now available to the trade in commercial quantities.

[1] Magnesium oxide block equals 100 when measured with General Electric spectrophotometer.

Letter to the Editor

(Continued from page 198)

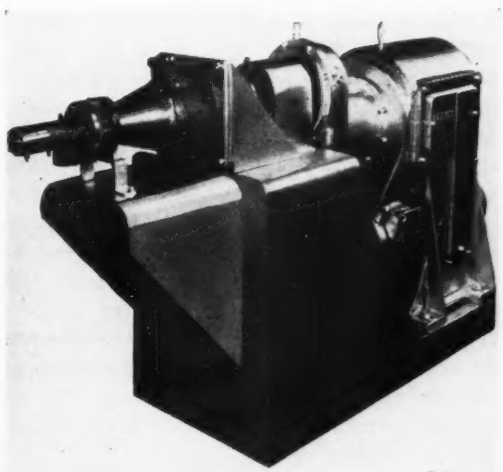
These figures are in fact closely in line with estimates of consumption by grades received from other countries.

When we compare these figures with the following private estimate of various grades of natural rubber produced during 1952, it is obvious that it is not a question of producers' inability to supply adequate quantities of clean rubber, but of consumers' preference, based on price considerations for the lower and less clean grades.

R.S.S. 1	24%
2	10%
3	17%
4	7%
5	5%
Pale Crepe	4%
Estate Brown	5%
Remilled Crepe	16%
Bark Crepe	3%
Liquid Latex	5%
Sole Crepe	2%
Brazil & other types	2%
	100%

It is interesting to note from I.N.I.R.O.'s research work that on the whole there is a remarkably close relationship between the dirt content based on the 325-mesh screen and the trade grades used—refer table 4 of their communication No. 84 II. This in itself is reassuring as it would indicate that in the absence of any other suitable "dirt content classification" the present visual grading of natural rubber is a fairly correct guide to the realistic inter-values of the various grades and types.

Yours faithfully,
H. T. KARSTEN



Continuous Mixer

A SMALLER model continuous mixer, intended for semi-works or laboratory use, has been added to the line of Flow-Master continuous mixers by Marco Co., Inc., Wilmington, Del. The new mixer, designated Model RF-7.5, has a maximum capacity of 90 gallons per hour, as compared with the larger models having capacities up to 10,000 pounds per hour. Similar to the other Flow-Master mixers in design, the new unit consists essentially of a cone shaped stainless steel head in which there operates an interrupted screw-type mixing device of the company's own design. This screw is driven by a five-horsepower motor through a Reeves variable speed drive.

Suitable for the continuous mixing, blending, or processing of liquid and/or dry materials, the mixer is expected to find use in the chemical, pharmaceutical, food products, and related industries. The new model is approximately 66 inches long, 22 inches wide, and 40 inches high.

Editorials

Will the Natural Rubber Industry Take the Right Fork in the Road?

THE ninth meeting of the International Rubber Study Group, which is scheduled to begin on May 11, in Copenhagen, Denmark, should be one of the most important that organization has ever held. The future of the natural and synthetic rubber producing industries should be, to a very great extent, decided at that meeting. Of course, the Rubber Study Group has no official capacity for making agreements that are binding on any of the member governments or the producing and/or consuming industries in the various countries represented, but as a result of the discussions that take place, the delegates and their advisers return to their respective countries with a good idea of what their policy will be for the immediate future.

The reason for attaching so much significance to this Rubber Study Group meeting is that the natural rubber producing industry is rapidly approaching a crossroads. Down one fork this industry can continue to follow the policies of the type of the Stevenson Rubber Restriction Scheme of 1922-28 and the similar International Rubber Regulation Agreement of 1934, and now exemplified in the "buffer stock" plan to be reviewed at Copenhagen. Down the other fork, the natural rubber producers can move toward more efficient operation by large-scale replacement of old, low-yielding trees with young, high-yielding stock, by planting new areas, and by preparing themselves to meet the competition from low-cost synthetic rubber by providing the same kind of selling and service, including technical service, to their customers, that will be provided by the producers of synthetic rubber.

As far as the United States is concerned, there is ample evidence that we will not support any worldwide scheme for the control of natural rubber prices such as is being proposed in the present "buffer stock" plan. Without our support it is not likely that such a scheme would work. In addition, we differ with the supporters of this plan in that instead of being concerned with a surplus of natural rubber, we foresee a shortage growing constantly more serious.

Statistical forecasts indicate that only small surpluses of natural rubber are likely this year and through 1954 and 1955. Supply should equal demand in the following year, and thereafter demand will exceed foreseeable supplies, with deficits rising from about 60,000 tons in 1957 to 250,000 tons in 1960.

We cannot overlook the fact, however, that for the 1953-1955 period, the natural rubber producing industry, if it continues voluntarily to limit its sales to Iron Curtain countries, needs assurance of a market elsewhere in order to meet rising costs. In this connection, we would like to refer to the editorial that appeared on this page in our November, 1952, issue, when it was pointed out that as soon as private industry took over the synthetic plants in this country, synthetic rubber would then really be sold and serviced in the same manner as other chemical products and emphasized further that:

"Either the producers and/or dealers in the United States will then have to provide the same kind of selling and service for natural rubber, or their volume of business will suffer materially."

It is interesting to note that the Natural Rubber Bureau of Washington, D. C., which has the responsibility for promoting the sale of natural rubber in the United States, says in its April, 1953, issue of "Natural Rubber News":

"One of the most useful fields of endeavor for the natural rubber industry, and for its manufacturing customers, would be for the natural rubber industry to promote technical service designed to stress applications of natural rubber for specific end-uses. Such a program should stress to the consumer the availability of quality advances in natural rubber products through the use of new compounding ingredients, methods and techniques.

"The natural rubber industry, in a sense, is hiding its light under a bushel. It is achieving technological advances in processes and compounding which the consumer should know more about. We foresee the day when the enlightened natural rubber importer and distributor will maintain on his staff a technical service representative able to show why and how natural rubber can solve his problem most effectively. Natural rubber can keep pace with all competitors as long as it keeps abreast of consumers' requirements and as long as it fully recognizes the vital functions of technical service and product development."

There is much reason to believe, therefore, that a large part of the natural rubber producing industry has finally accepted the fact that low priced synthetic rubber in tremendous volume will continue to dominate the scene as a permanent fixture even after synthetic rubber production becomes a private industry rather than a government operation in this country. It is believed that most of the natural rubber producing industry will take the right fork in the road leading to increased output at lower cost and with improved selling and service methods and thus try to retain their share of the world market for their product.

If so, the future for the rubber goods manufacturer for improved raw materials, and for the rubber goods consumer for improved products to buy, indeed looks bright.

R. G. Seaman

Some Design Considerations for Injection Molding Heating Chambers[1]

G. D. Gilmore[2] and G. B. Thayer[2]

THE general design of injection molding heating chambers has been well established after gradual development through several years of experience. Some of the details of design which are directly concerned with the plastic material characteristics have been examined to a limited extent. Very little engineering design information has been available for a careful consideration of these details.

Heat transfer and pressure losses in the heating chamber are interrelated, and the geometry of the passages through which the plastic moves can be arranged for optimum heat transfer rate with minimum pressure loss.

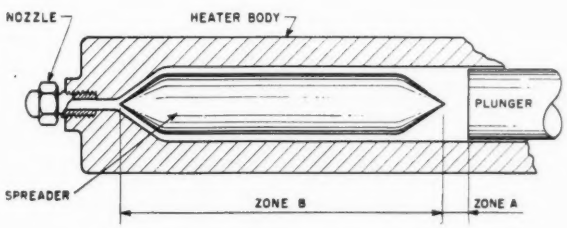


Fig. 1. Cross-Sectional View of Typical Heating Chamber

The available theoretical, experimental, and practical information concerning the behavior of plastic materials under high pressures in granular and fluid conditions is considered in this paper. This information is combined into a systematic approach to the geometrical problems of the design of injection molding heating chambers.

The following nomenclature is used in the paper:

- l = length of heating zone (inches)
- d_1 = heater body bore diameter (inches)
- d_2 = spreader diameter (inches)
- a = plastic slab thickness (inches)
- α = thermal diffusivity (square inches per second)
- Ti = heater chamber wall temperature (°F.)
- To = initial temperature of plastic introduced into the heating chamber (°F.)
- Ta = average plastic temperature at any contact time (t) (°F.)
- t = contact time of plastic against the heat source (seconds)
- t_o = total injection cycle (seconds)
- ρ = density of plastic (ounces per cubic inch)
- R = rate of plastic throughput (pounds per hour)
- n = number of effective sides delivering heat to a flat slab
- w = shot weight (ounces)
- F_a = applied force (pounds)
- F_r = resisting force (pounds)
- μ = coefficient of friction
- L_o = length of cold granules in heating chamber entrance before compaction (inches)
- D = diameter of plunger (inches)

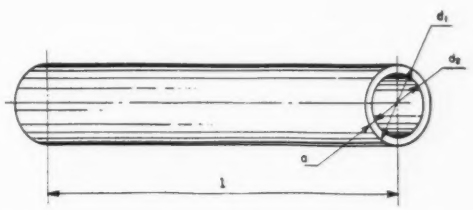


Fig. 2. Geometric Shape of "Infinite Slab" of Plastic in Zone B of Figure 1

The Injection Heating Chamber

The present-day heating chamber contains a spreader which is the essential feature of the design credited to Hans Gastrow prior to 1934. The cross-section of the typical heating chamber, without construction details, is shown in Figure 1. The thermoplastic material, and more specifically polystyrene, exists as hard granules when it is introduced at zone "A." The thermoplastic is progressively heated and leaves the nozzle in a relatively fluid state. All conditions between these two extremes exist in the heating chamber.

Heat Transfer Considerations

The major absorption of heat by the plastic takes place in zone "B," Figure 1. Plastic in this space has the shape of a tube, as shown in Figure 2. This tube can be considered as an infinite flat slab in its developed shape. Because of the simple geometric shape of the plastic in zone "B," heat transfer equations may be applied.

The theory of heat transfer through a flat slab has been

[1] Presented before the Rubber & Plastics Division, American Society of Mechanical Engineers, New York, N. Y., Dec. 5, 1952.

[2] Plastics technical service, Dow Chemical Co., Midland, Mich.

well established. The quantity of heat taken up by a unit slab of plastic depends upon three factors:

1. Thermal diffusivity
2. Temperature difference between the heating surface and the adjacent layer of plastic
3. Time of contact between plastic and heating surface.

The value of thermal diffusivity for polystyrene has been found experimentally to be 2.17×10^{-4}.[3] It is reasonably constant over the operating temperature range.

It has been found convenient to express temperature differential as a ratio of actual temperature rise of the entire mass of plastic to the maximum possible temperature rise. In accordance with the terms previously listed, this temperature difference ratio can be expressed as

$$\frac{Ta-To}{Ti-To} \tag{1}$$

It is also convenient to express time (t) in terms of the dimensions of the heating chamber and other terms commonly used in injection molding. The contact time is equal to the inventory weight divided by the shot weight and multiplied by the total cycle. This equation may be expressed as follows:

$$t=\frac{1\,\pi(d_1^2-d_2^2)\,\rho t_c}{4w} \tag{2}$$

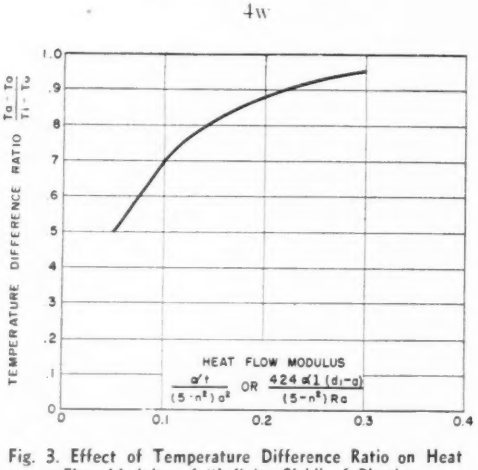


Fig. 3. Effect of Temperature Difference Ratio on Heat Flow Modulus of "Infinite Slab" of Plastic

The rate of plastic throughput (R) in pounds per hour may be introduced since it is equal to the shot weight divided by the total cycle.

$$R=\frac{225w}{t_c} \quad \text{or} \quad \frac{t_c}{w}=\frac{225}{R} \tag{3}$$

Substitution of equation 3 in equation 2 results in the expression:

$$t=\frac{225.1\,\pi(d_1^2-d_2^2)\,\rho}{4R} \tag{4}$$

The ratio of actual temperature rise to maximum possible temperature rise is a function (f) of thermal diffusivity, slab thickness, and contact time as follows:

$$\frac{Ta-To}{Ti-To}=f\left(\frac{\alpha t}{a^2}\right) \tag{5}$$

[3] Dow plastics basic research laboratory, unpublished observation.
[4] "Measurement of the Heating Capacity of Injection Molding Machines." C. E. Beyer, R. B. Dahl, *Modern Plastics*, Sept., 1952, p. 124.

The term $\left(\frac{\alpha t}{a^2}\right)$ may be called the heat flow modulus. This applies to a flat slab heated equally from two sides. If the slab is heated from only one side, the slab thickness must be considered as being twice its actual thickness, or 2a. In this situation equation 5 becomes

$$\frac{Ta-To}{Ti-To}=f\left(\frac{\alpha t}{(2a)^2}\right) \tag{6}$$

In the injection molding heating chamber, heat is usually supplied through the heater body to one side of the slab. Some heat, however, is supplied to the other surface of the slab by the spreader. In order to apply heat conduction equation 5 to heating chamber design it is necessary to introduce a coefficient for the section thickness. This coefficient is $(5-n^2)$, in which "n" is defined as the number of effective sides supplying heat to the plastic slab. Equation 5 then becomes:

$$\frac{Ta-To}{Ti-To}=f\left(\frac{\alpha t}{(5-n^2)a^2}\right) \tag{7}$$

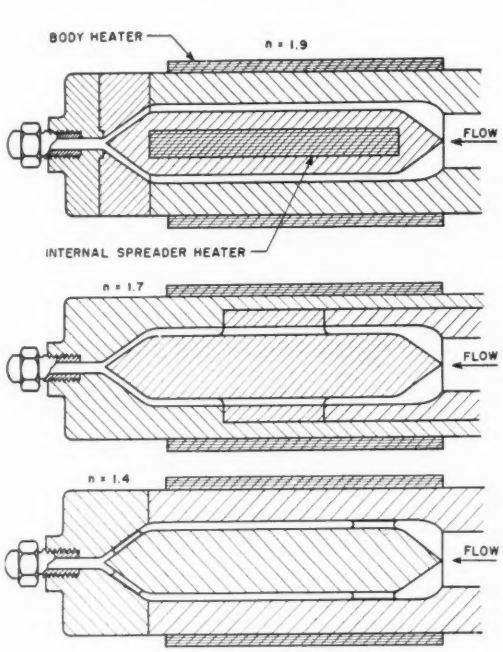


Fig. 4. Effect of Spreader Construction on Number of Effective Sides Supplying Heat: n = 1.9 for Spreader with Internal Heater; n = 1.7 for Spreader Rigidly Located within Heater Body; and n = 1.4 for Floating-Type Spreader

The relation expressed in equation 7 is shown graphically in Figure 3. The heat flow modulus is also expressed in terms commonly used in injection molding. This is obtained by introducing the expression for contact time as given in equation 4, and the elimination of d_2 since

$$d_2=d_1-2a \tag{8}$$

Plastic temperature measurements have been made on several commercial heating chambers.[4] The values of "n" for the various heating chambers were determined by substituting these temperature measurements, together with the heating chamber dimensions in the heat conduction relation indicated in Figure 3. The effect of

spreader construction on the number of effective sides supplying heat is shown in Figure 4. The values of "n" shown are average values over the range of production rates tested. The value of "n" is 1.4 for a spreader which floats within the heater body. The number of effective heating sides increases to 1.7 when the spreader is rigidly located within the heater body. Incorporating an internal heater in the spreader increases the value of "n" to 1.9.

The effect of these three spreader designs on the output of a heating chamber may be computed by assigning dimensions to a hypothetical heating chamber similar to such chambers in regular use in the molding industry. These dimensions are given in Table 1.

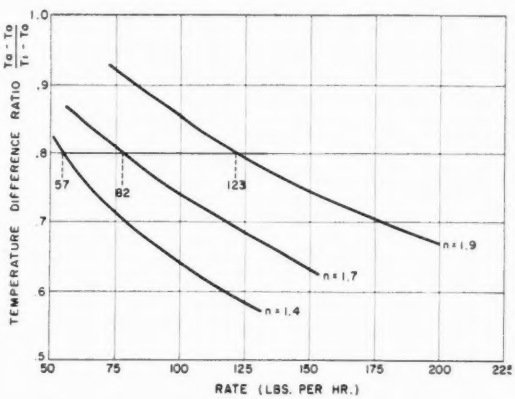


Fig. 5. Effect of Spreader Construction on Output Rate

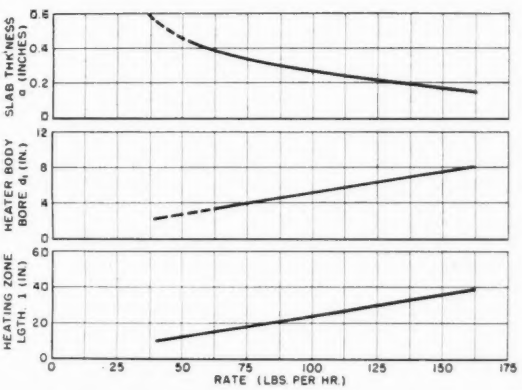


Fig. 6. Effect of Heating Chamber Geometry on Output Rate

TABLE 1. TYPICAL SPECIFICATIONS FOR HEATING CHAMBERS

Shot size (maximum), ounces	14
Maximum pressure, psi.	20,000
Speed of injection at 20,000 psi. pressure, inches per minute	120
Plunger diameter, inches	3.00
Stroke, inches	10
Heater body inside diameter, inches	4.25
Spreader diameter, inches	3.65
Heating zone length, inches	20
Output at 80% heating efficiency, pounds per hour	82

The curves of Figure 5 show the heating effects of the three designs of Figure 4. The curves have been drawn by substituting the dimensions assumed for the heater and the average values of "n" in the equation pictured by Figure 3.

Incorporating an internal heater in the spreader would be expected to increase the production rate from 82 to 123 pounds per hour at a temperature difference ratio of 80%. Using a floating spreader in this design to provide very little contact between heater body and spreader reduces the theoretical production rate from 82 to 57 pounds per hour.

The effects of heating zone length, heater body bore, and plastic slab thickness on the heating rate, using a value of "n" of 1.7, are shown in Figure 6.

As would be expected, any increase in the heating zone length or heater body bore produces a direct increase in heating rate. The effect of decreasing the section thickness of plastic by a small amount also is to increase the rate approximately in a linear fashion.

Several factors have been purposely omitted in the heat transfer considerations presented. Their introduction, however, would complicate the situation far beyond the value which could be attained at this time. Such factors as the velocity gradient in the plastic slab, frictional heating in the plastic, and heat received by conduction prior to entering the spreader section should be recognized as contributing to the heating rate of any given design.

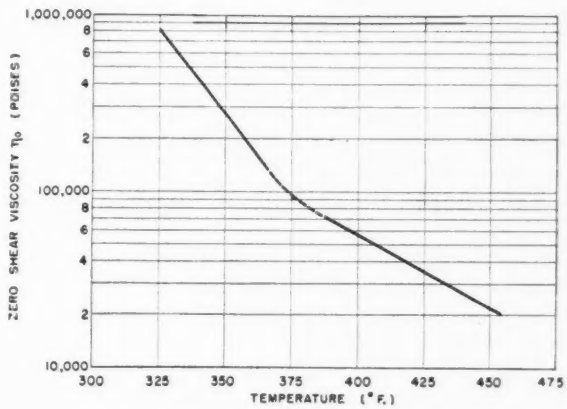


Fig. 7. Effect of Temperature on Viscosity of General-Purpose Polystyrene (Molecular Weight, 140,000)

Pressure Loss Considerations

Design details concerned directly with the characteristics of the plastic involve pressure requirements in addition to heat transfer. As was pointed out previously, the thermoplastic exists in the heating chamber as a hard, rigid material at the entrance. The material at the nozzle end exists in a relatively fluid state, although still highly viscous. At a temperature of 425° F. its viscosity at zero shear is approximately 35,000 poises. Its viscosity increases very rapidly to 800,000 poises at 325° F., as shown in Figure 7. It is evident this typical thermoplastic polystyrene is a highly viscous material, the viscosity of which is extremely sensitive to temperature.

Excellent tools are available to analyze pressure losses under ideal equilibrium conditions.[5] These may be applied although a wide range of conditions exist in the heating chamber, as has been shown. The reliability of any pressure loss analysis would seem questionable, but only as far as absolute values are concerned. Using these tools in considering the heating chamber necessitates certain assumptions which may affect the numerical magnitude of the results obtained. Nevertheless they provide a starting point and present a relative picture which, at least, points the direction in which the design should go.

Using the procedure suggested by Wiley and Pierce[5] the following assumptions are necessary:

1. The plastic in the heating chamber may be considered in two parts: the region "B," occupied by the

[5] "Pressure Drop of Fluid Polystyrene in Conduits." R. M. Wiley, J. E. Pierce, *Chem. Eng. Progress*, 47, 8, 432 (1951).

spreader, is the heating zone; while the region "A," between the spreader and the plunger, is the cold zone.

2. In the heating zone the plastic may vary in temperature from 100 to 500° F. At maximum throughput the plastic may be considered as being at an equilibrium temperature of 300° F.
3. Pressure loss in the cold zone can be considered independently as a friction phenomenon.

For the heating chamber with specifications as listed in Table 1, the effect on pressure loss of changing each dimension independently is plotted in Figure 8. As might be expected, any increase in length results in a direct increase in pressure loss. A considerable change in heater body bore has a negligible effect on the pressure loss. A small decrease in section thickness, on the other hand, produces a large increase in pressure loss.

Of even greater importance in analyzing the pressure losses is the cold zone. Here granules of material are compressed under very high pressure at temperatures so low they are not appreciably distorted. The result is an extremely high-pressure loss.

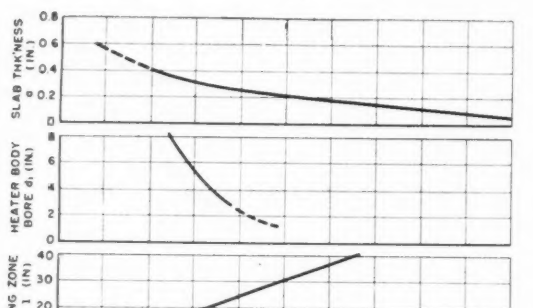


Fig. 8. Effect of Heating Chamber Geometry on Pressure Loss

The results of experiments in this regard have been published,[6] and for static conditions the following relation was found:

$$\frac{F_a}{F_r} = e^{\frac{4\mu L_c}{D}} \qquad (9)$$

For the maximum shot size of 14 ounces, taken from Table 1, the cold zone would produce pressure losses as plotted in Figure 9. Since it is assumed that the shot size is constant, the effect is plotted in terms of plunger diameter only. The effect of wall temperature results from the change in the coefficient of friction. An increase in wall temperature of 100° F. is as effective in reducing the cold zone pressure loss as increasing the plunger diameter by a factor of two. The effect of an external lubricant is to reduce the pressure loss, as has been experienced by many molders.

Conclusions

It would be desirable to be able to specify an exact design incorporating a maximum heating rate and a minimum pressure loss. Since several assumptions have been made, particularly in regard to pressure losses, an exact specification cannot be drawn. There are, however, indications as to the approach to be taken. These together with suitable experiments designed to establish the reliability of any assumed conditions should provide sound engineering design information. Experiments of this type have been successful.[7]

Considering the specifications as listed in Table 1, the maximum heating rate with minimum pressure losses is approached by the following design changes:

1. Increase the heater body bore. This change actually increases the inventory and results in a smaller pressure loss.
2. The heating zone length may also be increased, and the section thickness decreased. These changes should be held to a minimum since they increase the pressure loss.
3. The spreader construction is very important, for by the use of an internal heater the heating rate can be increased 50%.

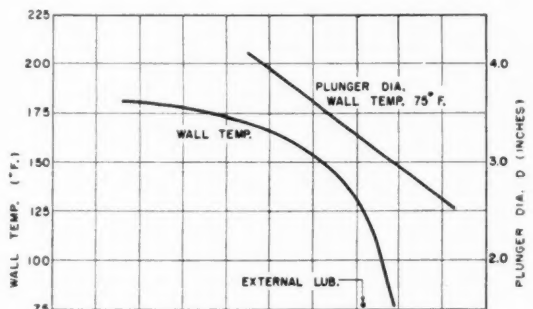


Fig. 9. Temperature and Pressure Loss Relations in the Cold Zone of the Heating Chamber

4. Pressure losses may be considerably lowered by proper attention to the cold zone. A high wall temperature in the cold zone is desirable. Even a change in plunger design to accommodate its working against partially melted material should be attempted. Further decrease in pressure loss can be obtained by an increase in the plunger diameter.

These design changes, within limits, should greatly improve the heating chamber discussed. They would also apply to other specific designs patterned after the Gastrow unit.

Vinyl Electrical Tape

A BLACK vinyl plastic electrical tape, Royalastic, comes from United States Rubber Co. This tape consists of a plastic film about six mils thick plus a pressure-sensitive adhesive of one-mil thickness. A tensile strength of 20 pounds per inch of width and a dielectric strength of approximately 10,000 volts are claimed for this product, along with good adhesion at low temperatures, resistance to abrasion, sunlight, water, acids, alkalies, oils, and ambient temperature aging, and non-corrosion toward electrical conductors. The tape is available in 66- or 30-foot rolls ¾-inch wide, and in 10-foot rolls ½-inch wide.

[6] "Behavior of Granulated Polymers under Pressure" R. S. Spencer, G. D. Gilmore, R. W. Wiley, *J. Applied Phys.*, 21, 6, 527 (1950).

[7] "Basic Features Influencing the Performance of Injection Molding Machines," E. Gaspar Projectile & Engineering Co., Ltd., London, England (1951). Reprinted from "Plastics Progress" Iliffe & Sons, Ltd., London (1951).

Meetings and Reports

ASTM Committee D-20 on Plastics Holds Spring Meeting

COMMITTEE D-20 on Plastics, American Society for Testing Materials, held its spring meeting on March 23-25 at Pocono Manor Inn, Pocono Manor, Pa. Approximately 60 members and other interested persons attended the meeting, which was held in conjunction with the meeting of Committee D-9 on Electrical Insulating Materials on March 25-27. Chairman R. K. Witt, Johns Hopkins University, presided over the D-20 sessions and was assisted by Secretary G. M. Armstrong, Tennessee Eastman Corp. The first day was taken up by section meetings; while the remaining two days consisted of meetings of the various sub-committees, except for Subcommitte IV on Optical Properties, which canceled its meeting.

Committee D-20 Meeting

The full committee meeting was held on the afternoon of March 25, with some 40 members present. Mr. Armstrong reported on the advisory committee meeting held the previous evening. E. B. Cooper, E. I. du Pont de Nemours & Co., Inc., has resigned as a member of the American delegation to ISO/TC-61, the technical committee on plastics of the International Standards Organization, and his place on the delegation has been taken by Robert Burns, Bell Telephone Laboratories.

Reports were presented of the subcommittee meetings, as given below. Section changes approved by the advisory group follow: Section A of Subcommittee II, name changed from "Rockwell Hardness" to "Indentation Hardness"; Subcommittee I, new section established on stiffness measurement; and Subcommittee VI, new Section U established on Halocarbon Plastics.

Dr. Witt announced that D-20 will hold its summer meeting with the parent Society in Atlantic City, N. J., during the week of June 29. Headquarters for D-20 will be Chalfonte-Haddon Hall Hotel. The fall meeting of D-20 will also be held in Atlantic City some time during the latter part of September, and the Spring, 1954, meeting is scheduled for Hotel Roanoke, Roanoke, Va., in conjunction with Committee D-9.

Subcommittee Meetings

Subcommittee I—Strength Properties. R. M. Berg, Carbide & Carbon Chemicals Co., chairman. A revision of D882-49T, on tensile properties of thin sheets and film, is under way. Results of the round-robin test program on the ski-ball impact test are not conclusive, and no further work on this test is planned at present. A revised version of D256-47T, on impact resistance, will be sent to subcommittee letter ballot. A round-robin program is under way on dynamic property testing, and results are expected to be available at the next meeting. The group is considering the establishment of a new section on film stiffness. Under review as new business are the needs of tests on plastic pipe, and drop-type impact tests.

Subcommittee II—Hardness Properties. H. L. McChesney, Monsanto Chemical Co., chairman. As the result of a round-robin test program, a revision of D1044-49T, on abrasion resistance of transparent plastics, has been prepared and will be sent to subcommittee letter ballot. New chairmen are needed for Section A on Indentation Hardness and Section H on Mechanical Abrasion Resistance.

Subcommittee III—Thermal Properties. C. H. Adams, Monsanto, chairman. D621 will be amended to include a footnote indicating the importance of annealing specimens before testing for deformation under load. The Wright stress relaxation test will be discussed at the fall meeting, when results of an investigation will be available. The round-robin on the SPI flammablity test for thin sheets and film has not been completed as yet. The inclined plate flow test suggested by SPE will be investigated. Available methods for determining heat distortion of thin films are being studied. Work to date on D746-44T, on brittle points, has not resolved the problem of the relative values of motor driven and solenoid actuated striking arms. Further studies will be made. Different methods for determining the brittle points of thin film are being studied. A study is also being made of the need of methods to determine thermal conductivity and specific heat of plastics.

Subcommittee V — Permanence. J. W. Mighton, Dow Chemical Co., chairman. A prototype compartmentalized oven for use in heating tests is being tested by Bakelite Co., and a report will be presented at the June meeting. A revision of D570-42, on water absorption, to delete the requirement for initial weighing is being sent to letter ballot of Section C. The proposed test method for shrinkage of laminated thermosetting plastics at elevated temperatures has been given D-20 approval and is being sent to the Standards Committee. Further work on this test will investigate the relative values of bar and disk specimens. A recommended practice for outdoor exposure testing will be prepared and circulated among the members of Section H on Outdoor Exposure.

Subcommittee VI — Specifications. Lucius Gilman, Picatinny Arsenal, chairman. A proposed specification for decorative laminated thermosetting sheets is being sent to D-20 letter ballot. Pending final approval of the proposed revision to D708-44T, on vinyl chloride-acetate sheets, work will begin on a further revision to include newly available materials. Proposed revisions of D702-46, on cast methacrylate, and D788-48T, on methacrylate molding compounds, will be presented at the June meeting. Work is under way on a revision of D703-49T, on polystyrene molding compounds, to include modified styrenes. Data are being gathered to determine the need of adding a requirement on deformation under load to D787-46T, on ethyl cellulose molding compounds. A classification of non-rigid plastics is under way as the first step in the preparation of a new specification to cover these materials. The specification proposed by the D-11 and SAE joint Technical Committee A on non-rigid materials is considered too loose for plastics, and a more stringent specification will be prepared.

Work on the proposed specification for nylon plastics is awaiting the results of D-20 letter ballot. Work is in process on the inclusion of a saponification number requirement in the proposed specification for dioctyl phthalate plasticizers, and a report is expected at the June meeting. A study of D728-44T, on vinyl molding compounds, will be made as the basis of a proposed revision to cover recent materials and both molding and extrusion compounds.

Subcommittee VII — Analytical Methods. H. E. Riley, Bakelite, chairman. The study of methods for determining plasticizer extraction is still in progress. A new method for determining total chlorine content will be presented at the June meeting. Work is in process on methods for determining volatile content and particle size, and a round-robin will be started on electrical properties. A proposed method for testing the paste-forming ability of dry-blend resins is being studied. Work is to start on a proposed thermal stability test for plasticizers.

Subcommittee VIII — Research. C. R. Stock, American Cyanamid Co., chairman. Two papers and a demonstration were presented at this session, as follows: "Increasing the Efficiency and Economy of Experimentation," E. Harrington, Monsanto; "Evaluation of the Boor-OQMG Snag Tester," L. Boor, Army Quartermaster Corps, and J. J. Lamb, C. Brown, and F. W. Reinhart, all of the National Bureau of Standards; and "Demonstration of the Dozi Impact Strength Tester," Mr. Burns.

Mr. Harrington discussed the use of statistical analysis in the proper design of experimentation programs, showing how tests can be set up to test one, two, or more variables. The use of replication and confounding to eliminate needless test work was stressed, as was the effect of interactions when two or more variables are being tested.

The paper on the snag tester was presented by Mr. Reinhart. Using a needle mounted on the striking arm of a modified Izod impact tester, the machine gives data on the resistance to snagging and tearing of plastic films and coated fabrics. Results were given of an evaluation program which determined the effects of test variables, including needle size and taper, angle of specimen to striking arm, tension load on specimen, relation of fabric orientation to snagging with coated fabrics, and the effect of wrinkles and creases in the specimen. The test was shown to give valid results.

In demonstrating the Dozi tester, Mr. Burns noted that the standard Izod impact tester shows a substantial error in evaluating low-strength material because of the so-called toss factor (energy consumed in tossing away the broken half of the specimen). Other impact tests, such as the falling ball, ski-ball, and flywheel methods, give more accurate results, but are not so quick and convenient to run as the Izod. The Dozi tester (Izod spelled backwards) reverses the Izod machine in that the specimen rides with the striking arm, while the striking edge is fixed where the Izod specimen is mounted. As demonstrated by the speaker, this machine retains the convenience of the Izod, but gives results having the accuracy of the more elaborate test methods because the toss factor is eliminated.

Subcommittee IX—Molds and Molding. J. L. Williams, Dow, chairman; Mr. Mighton acted as chairman in the absence of Mr. Williams. A long-term round-robin is in progress to determine the effects of gating and electronic heating for D1046-49T, on transfer molding of phenolics. Method D955-48T, on mold

shrinkage, is in agreement with Committee D-9's method D551-41. The combining of these two methods into one standard will be proposed to D-9.

Subcommittee D—Definitions. C. H. Alexander, B. F. Goodrich Chemical Co., chairman. Definitions have been approved for the terms: alkyd plastics, polyester plastics, halocarbon plastics, resin, volatile loss, and meta-stable. It was voted not to define the terms: extractability, migrability, mobility, and volatility. It was decided to retain the existing definitions of a-resin, b-resin, and c-resin, and to add footnotes that these definitions correspond to those of resole, resitole, and resite, respectively. A letter ballot of the subcommittee will be made on proposed definitions of the terms: plasticizer, reinforced plastic, filler, gel, blocking, creep, cold flow, crazing, bag molding, catalyst, inhibitor, cure, delamination, and non-rigid plastics.

Subcommittee XIV—Conditioning (Joint with Committee D-9). A. C. Webber, du Pont, chairman. The study of methods of measuring relative humidity is still in progress. The new specification, D1197-52T, on enclosures and servicing units for tests above and below room temperature, has replaced D760 and D761. American Instrument Co. reported on an exhaustive testing program evaluating the requirements of D1197 as regards temperature and humidity characteristics of enclosures. This program showed several provisions of D1197 to be impractical or confusing. Further reports are being awaited from other manufacturers of test chambers before this specification is revised. It was decided to send D618-49T, on conditioning methods, to a joint letter ballot of D-20 and D-9 for a decision on whether to advance the method to a standard. An editorial change was made in D618 to permit special conditioning periods for thin films upon agreement by distributor and purchaser.

Plastics Talks at New York Meeting

SOME 260 members and guests of the New York Rubber Group attended the spring meeting on April 10 at the Henry Hudson Hotel, New York, N. Y. The program included an afternoon technical session, cocktail hour, dinner, and entertainment. The technical session highlighted three speakers from Naugatuck Chemical Division, United States Rubber Co., on the general topic of new rigid structural plastics. The speakers and their subjects were: D. Lorin Schoene, "Kralastic"; A. M. Stover, "Recent Developments in Rigid Polyvinyl Chloride"; and P. M. Elliott, "Polyester Resins."

Dr. Schoene began his talk with a discussion of the resin-rubber concept, showing how these blends combine the hardness, rigidity, and solvent resistance of the resin with the toughness of rubber. An interesting example of these blends is the Kralastic system, which employs a styrene-acrylonitrile copolymer resin blended or alloyed with a butadiene-acrylonitrile rubber. By variations in composition ratios, it is possible to provide a wide range of properties in the finished blend. The properties of the various commercial grades of Kralastic were discussed in detail, with special emphasis on Kralastic J, a compound which maintains hardness and high impact resistance at temperatures down to —60° F. The speaker also described processing and molding techniques and typical applications, using slides to illustrate actual end-products.

Mr. Stover noted that the use of rigid vinyls by industry in this country is still at a relatively early stage as compared with European practices, but domestic usage is expanding rapidly. Naugatuck is currently offering three types of rigid Marvinols for the extrusion trade; (1) Marvinol NR-7020, a general-purpose compound; (2) a compound having extremely high notched Izod impact strength (15-20 foot-pounds per inch as compared with less than one foot-pound for conventional rigid vinyls); and (3) a transparent compound for pipe applications requiring the observation of liquid flows. A new use of vinyl is in Marvinol-Metal Laminate, which consists of a semi-rigid polyvinyl chloride adhered very tightly to sheet metal such as steel or aluminum. These laminates provide the corrosion resistance of the plastic and the formability, strength, and rigidity of sheet metal. These laminates can be fabricated by most of the conventional processes used for sheet metal, including stamping, deep drawing, and crimping.

Dr. Elliott, the final speaker, discussed the Vibrin polyester resins, their nature, production, curing reaction, properties, and use in the production of glass-fiber reinforced products. Using slides to illustrate his talk, the speaker discussed the steps involved in the production of parts by matched metal molds, bag molding, and forming of sheets. Applications for polyesters range from aircraft parts, as originally used during the war, through trays, pipe, and machine parts, to plastic automobile bodies and other potentially large-volume structural uses.

SPE Sections Meet

High-Impact Polystyrene

APPROXIMATELY 85 members and guests of the New York Section, Society of Plastics Engineers, attended a regular dinner-meeting on April 15 at the Gotham Hotel, New York, N. Y. Speaker of the evening was E. L. Kropscott, Dow Chemical Co., who discussed "High-Impact Polystyrene."

After reviewing the development of Styron 475, a high-impact styrene, Mr. Kropscott stated that 400-550° F. is the normal range of cylinder temperature for molding the material. It has been found that the exposure of Styron 475 to prolonged periods at high temperatures can result in a definite reduction of physical properties. For example, an increase in material molding temperature from 400 to 550° F. can reduce elongation by one-half, and lower tensile and impact values. In addition, high plastic temperatures can result in excessively long cycles, sink marks, bubbles, silver streaks, warping, and color changes.

The pressure required for proper molding will normally be in the range of 10,000-18,000 psi., but the lower the pressure in this range the higher the physical properties. The speaker emphasized that mold temperature control is an important factor with Styron 475 not only because of its effect on properties, but also because of its effect on surface luster of the molded part. The critical mold temperature for Styron 475 is 160° F., and temperatures below this point will give poor luster, nonuniform appearance, and prominent flow lines and weld marks. It is also necessary to control the mold temperature in localized spots. Areas around gates, for example, may become excessively hot and require added cooling.

Mr. Kropscott urged that molding of Styron 475 for products requiring dimensional stability be in accordance with the following four rules: (1) use proper amount of material; (2) fill the mold quickly; (3) seal off the mold after filling; and (4) avoid packing the material in the mold. Strain in molded parts can be relieved by use of annealing, which also often raises the heat distortion temperature of the parts. In discussing the permanence of Styron 475 moldings, the speaker noted that cold temperatures in service will greatly reduce impact strength. Aging environment also has a marked effect on properties, and reductions in impact strength result from exposure to ultraviolet light, outdoor weathering, use of paints and cleaners, and continued stressing of parts. In conclusion, Mr. Kropscott stated that future developments in high-impact styrene should result in better color availability, improved weathering, better heat resistance, and improved low-temperature impact.

Rounding out the program was a talk on "How to Improve Reading Speed and Accuracy" by K. P. Baldridge, S. R. Gibson, and Ruth Machlin, all of Reading Laboratory, Inc. Using slides to illustrate their talks, the speakers showed how the Laboratory's specialized reading training courses can be used to improve greatly reading speed and retention.

The meeting concluded with a drawing for door prizes contributed by Emenee Industries, Inc.; Fiberoid Doll Co.; Monsanto Chemical Co.; and Naugatuck Chemical Division, United States Rubber Co.

Plastics in Abrasive Goods

The Buffalo Section, SPE, featured at its March 20 dinner-meeting a talk by Peter L. Shanta, Carborundum Co., on "Resin Bonded, Laminated, and Reinforced Abrasive Products." Dr. Shanta began by noting the present necessity of increasing the strength characteristics of abrasive compounds in order to compensate for the continually increasing speeds at which grinding and cut-off wheels are operated. To insure safety at the higher speeds, plastics are being used in making wheels and in reinforcing plastic-bonded wheels.

In this respect the speaker stated that the use of chemical adhesion between abrasive grain and resin bond has performed satisfactorily in the past. Present trends, however, are toward mechanical or physical reinforcement, with the latter type employing woven and non-woven fabrics of glass, cotton, or nylon; glass or nylon cords; or flock of glass or synthetic or natural fibers in this capacity.

Dr. Shanta concluded his talk with a comparison between various industries using unfilled, powered phenolic plastics, including the abrasive, shell molding (foundry) and brake-lining industries.

Panel Discussion at Toronto

A panel discussion by experts from within the group featured the March 17 dinner-meeting of the Ontario Section, SPE. Held at the St. Regis Hotel, Toronto, Ont., Canada, the meeting attracted an attendance of 38 members and guests. Malcolm Wilkinson, Canadian Industries, Ltd., acted as moderator, and the panel members were T. A. McLellan, Duplate Canada, Ltd., Murray Spencer, Ray Plastics, Ltd., and Trygve Wold, Smith & Stone, Ltd.

Mr. McLellan answered questions on extrusion and discussed the possibility of operating an extruder up to the limit of

its rated capacity by means of multiple orifices. Questions on injection machines were dealt with by Mr. Spencer, who talked on the advisability of operating the machines at rated capacities. Mr. Wold replied to questions from the floor dealing with compression molding and spoke about methods of reducing or eliminating flash on compression molded parts.

Steels for Plastics

A talk on "Steels for the Plastics Industry" by Norman E. Woldman, metallurgical consultant and editor of *Alloy Digest*, featured the April 8 dinner-meeting of the Newark Section, SPE, held at the Military Park Hotel, Newark, N. J. Approximately 115 members and guests heard Dr. Woldman discuss the different types of steels and their applications in the plastics industry. The advantages and disadvantages of the various types of steels were discussed for use in molding, extruding, forming, grinding, and compounding operations, and the speaker described the factors to be considered in the selection of steels for production molds, short-run molds, and extruder dies.

Monsanto Enters Polyethylene Field

MONSANTO CHEMICAL CO., Springfield, Mass., has announced its intention to enter into the field of manufacturing polyethylene, with plans for constructing a new plant to produce the plastic at an initial annual rate of 66,000,000 pounds when it begins operation early in 1955. This step will make Monsanto the first company to produce all of the "Big Six" in plastics materials; styrene, phenolics, cellulosics, vinyls, and aminoplasts are currently being manufactured.

The new plant has been designed from data gathered after three years of process research on high-pressure polymerization techniques at Monsanto's Central Research Department laboratories in Dayton, O. The site for the new unit will be chosen when current studies on raw material sources and market locations are completed. The unit is expected to increase its annual capacity to 99,000,000 pounds by 1957, a production rate which is expected to supply 20-22% of the anticipated demand for that year.

Concurrent with this report was a company announcement that the Dayton research facilities are constructing a second high-pressure pilot plant to permit expanded studies on polyethylene. The new pilot plant, expected to begin operations in late April, will be concerned with the study of alternate methods for the manufacture of this plastic, including processes both commercially available and in development status.

Transitions in Teflon

THE National Bureau of Standards, Washington, D. C., in the course of it studies of basic constants and fundamental properties of high polymers in an attempt to be in a position to formulate new polymers having specific characteristics, has investigated the transitions of Teflon (polytetrafluroethylene). Applications of this material in products requiring dimensional stability have dictated the importance of identifying any transition points and their accompanying volume changes. In these experiments the pressures were applied by means of a hydraulic system, and the changes in volume were measured to 0.001-inch with a dial gage.

C. E. Weir, of the Bureau, found that Teflon is unique among all high polymers studied to date in that it exists in three polymeric forms within the range of 10 to 80° C. at pressures between one and 10,000 psi. The substance "melts" at 330° C., passing from a crystalline to an amorphous phase. Previous investigations at NBS and elsewhere had shown the existence of two other transition points at room temperature: one occurring under atmospheric pressure; the other under a pressure of 5500 atmospheres. The first of these transitions takes place at about 20° C. and involves approximately at 1% change in volume. Actually, this transition, which is reversible and involves a change in the X-ray diffraction pattern, is not a simple effect, but rather a complex transition appearing to consist of two overlapping volume discontinuities, one centered at 20° C., and the other at 30° C. The second room-temperature transition, at 5500 atmospheres, takes place at 25.5° C. and involves a volume change of about 2.5%.

CALENDAR

May 15.	**Buffalo Rubber Group, and Ontario Rubber Section, C.I.C. International Meeting. General Brock Hotel, Niagara Falls, Ont., Canada.**
May 19.	**Elastomer & Plastics Group, Northeastern Section, A. C. S.**
May 20.	**Washington Rubber Group.**
	New York Section, SPE. Hotel Gotham, New York, N. Y.
May 22.	**Chicago Rubber Group, Chicago, Ill.**
May 27-29.	**Division of Rubber Chemistry, A. C. S. Hotel Statler, Boston, Mass.**
June 2.	**The Los Angeles Rubber Group, Inc. Hotel Statler, Los Angeles, Calif.**
June 4.	**Northern California Rubber Group.**
June 5.	**Division of Rubber Chemistry, C.I.C. Windsor, Ont., Canada.**
June 6.	**Southern Ohio Rubber Group. Summer Outing. Inland Recreation Center.**
June 11.	**New York Rubber Group. Annual Outing, Sundance Lodge, Caldwell, N. J.**
June 15-19.	**Exposition of Basic Materials for Industry. Grand Central Palace, New York, N. Y.**
June 16.	**Buffalo Rubber Group. Summer Outing. The Transit Valley Country Club.**
June 19.	**Boston Rubber Group. Summer Outing.**
	Akron Rubber Group. Summer Outing. Firestone Country Club.
June 29-July 3.	**American Society for Testing Materials. Annual Meeting, Chalfonte-Haddon Hall Hotel, Atlantic City, N. J.**
July 24.	**Chicago Rubber Group. Summer Outing.**
Aug. 4.	**New York Rubber Group. Golf Tournament. Baltusrol Golf Club, Springfield, N. J.**
Aug. 21.	**Philadelphia Rubber Group. Annual Outing. Cedarbrook Country Club, Philadelphia, Pa.**
Sept. 9-11.	**Division of Rubber Chemistry, A. C. S. Sherman Hotel, Chicago, Ill.**
Sept. 17.	**Southern Ohio Rubber Group. Engineers' Club, Dayton, O.**
Sept. 19.	**Northern California Rubber Group. Summer Picnic. Adobe Creek Lodge, Los Altos, Calif.**

Shawinigan Expansion

SHAWINIGAN RESINS CORP., Springfield, Mass., has announced an expansion of its vinyl resin facilities to increase current production capacity by 35%. This is the fourth expansion in the ten-year vinyl production history of the corporation, which is owned and operated jointly by Shawinigan Products Corp. and Monsanto Chemical Co.

The major portion of the expanded facilities will be devoted primarily to the manufacture of Butvar polyvinyl butyral, although Gelva polyvinyl acetate resins and emulsions, Gelvatal polyvinyl alcohol intermediate, and Formvar polyvinyl formal will also be produced in the new units.

Rigid Vinyl Plastics

A TALK on "Rigid Polyvinyl Chloride Plastics" by C. E. Parks, B. F. Goodrich Chemical Co., was given at the April 16 dinner-meeting of the Quebec Rubber & Plastics Group. Held jointly with the Quebec Section, SPE, and the SPI (Canada), the meeting took place at the Queen's Hotel, Montreal, P.Q., Canada, and was attended by approximately 60 members and guests of the three groups. J. C. Gillis, Northern Electric Co., Ltd., presided.

Mr. Parks stated that high molecular weight rigid vinyl plastic can well provide the next expansion cycle for the vinyl industry since it opens up new fields of application. Greater usage of rigid vinyl is handicapped by insufficient knowledge of processing know-how. The most important factor is temperature control, since the processing temperature is relatively narrow for every operation. Initial processing can be done either on a mill or by a combination of Banbury and mill mixing, with the latter method recommended.

Extrusion of rigid vinyl can be done on either a single- or double-screw machine, but special take-up equipment is necessary to hold the extruded shape in the desired position until it cools. Calendering can be done on standard machines set to operate with small rolling banks, and at speeds somewhat less than for plasticized vinyls. Experience to date indicates that the fundamental flow properties of rigid vinyl are such that conventional injection molding is impossible. Extruded rod cut to proper length while still hot (360° F.), however, can be transfer molded with satisfactory results. Laminated sheets up to one inch thick can be built up from calendered or milled sheets by direct heating in a press. Rigid vinyl fabrication operations can be performed with practically all machine tools used for wood and metals. Being a thermoplastic material, the plastic can also be bent, drawn, vacuum molded, blow molded, and welded.

Scientific and Technical Activities

Many Special Features Planned for Rubber Division Boston Meeting in May

THE local committee on arrangements for the sixty-third meeting of the Division of Rubber Chemistry of the American Chemical Society has made a special effort to provide a full and varied program, as far as the non-technical part within their jurisdiction is concerned, for both men and women attending this meeting. Convention headquarters will be at the Statler Hotel. The chairman of the Rubber Division is Seward G. Byam, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. The chairman of the local committee on arrangements for this Boston meeting is Harry W. Sutton, Boston Woven Hose & Rubber Co., Cambridge, Mass.

The local committee has pointed out that Boston, capital city of the Commonwealth of Massachusetts and famous for its colleges, universities, and industrial and technical research, offers much to visiting conventioners. On Thursday afternoon, May 28, members can visit the Ford Motor Co., in nearby Somerville, where they will watch the complete assembly of a Ford car. They can inspect the control and research laboratory, the polymerization plant, and the model cannery where the application of can sealing compounds will be demonstrated at Dewey & Almy Chemical Co., in Cambridge. There will be other stops along "Research Row," world-renowned for its concentration of research institutions and industrial laboratories, bordering the Charles River, also in suburban Cambridge. An opportunity will also be offered to inspect the new reclaiming plant of Boston Woven Hose, and the continuous vulcanizer and extruder at the Simplex Wire & Cable Co. plant. A special high-voltage demonstration is also planned for the visiting Division members at the Simplex plant. At Hood Rubber Co., Watertown, visitors may witness the entire process of manufacturing rubber footwear.

25-Year Club, Division Banquet, Etc.

Members of the Division's 25-Year Club will convene at a special luncheon meeting on Wednesday, May 27. On the evening of the same day the famous Boston Pops orchestra, under the direction of Arthur Fiedler, will present a program especially planned to include college songs and selections chosen for their appeal to audiences everywhere. Soft drinks, wines, and champagnes will be served during the concert.

The banquet of the Rubber Division will be held on Thursday evening, May 28, at the Statler Hotel, with a program in which the officers of the Division and distinguished associates will participate, and an interesting entertainment program has been planned, including "Wally" Cox of Mr. Peepers fame.

Ladies Program

A Boston "Get-Acquainted Tea Party" will help the women guests to enter into the spirit of the convention. By courtesy of Northeast Airlines, an airplane flight over Boston and the surrounding area will be offered to the ladies at $1.00 each. For those who are interested, a guided bus tour will take the women to many of the historical sites, such as the Old North Church, the Charlestown Navy Yard, Bunker Hill Monument, and the home of Paul Revere. On through the market district, the tour will proceed to Faneuil Hall, "Cradle of American Liberty," echoer of the voices of such famous men as Samuel Adams, John Hancock, and James Otis, and still used today as a public meeting house. The tour will end at the Isabella Stewart Gardner Museum, where visitors may view the distinguished collection of fine tapestries and paintings and other works of art collected by Mrs. Jack Gardner in her lifetime.

Technical Sessions and Program

Abstracts of the papers to be presented, together with their authors and affiliations and the program in some detail, are given below. The author's name in heavy type indicates the person presenting the paper.

WEDNESDAY—MAY 27

11:30 a. m. **25-Year Club Luncheon Meeting.** William E. Kavenagh, Goodyear Tire & Rubber Co., chairman.

TECHNICAL SESSION NO. 1—S. G. BYAM, PRESIDING

2:00 p.m.—1. **Introductory Remarks. S. G. Byam,** Division chairman.

2:10 p.m.—2. **Effect of Variations of Oil Composition on Physical Properties of Cured Masterbatched Polymer Compounds.**[1] W. K. Taft, **R. W. Laundrie,** J. Duke, A. D. Snyder, Government Evaluation Laboratory, Akron, O.

A series of oils submitted by Esso Standard Oil Co., varying in so-called "aromaticity," defined as the acid reactive hydrocarbons as determined by the Rostler method, were masterbatched with high Mooney viscosity GR-S 1500-type latex to determine possible correlations between the "aromaticity" of the oils and the physical properties of the vulcanizates of the masterbatched polymers. Besides this series of oils, Circosol 2XH, Sundex 53, Califlux GP, and Dutrex 20, together with Resin 731 and 1/2 Resin 731/Circosol 2XH, were included. The GR-S 1500 latex, with a contained polymer of about 160 ML-4 viscosity, was masterbatched with 45 parts of oil.

It was found that many properties of the masterbatches generally can be correlated with the differences in "aromaticity" of the oils. Tensile strength, modulus, optimum cure, hysteresis, freeze point, hardness, and possibly hot rebound increased with increase in the "aromatic" content of the oil used in the masterbatch. Flex life of the vulcanizates became poorer with increased "aromaticity" of the oils in the stocks. The mill processing or Garvey die extrusion characteristics of the masterbatches were all good, and no correlation was found with the type of oil. Power consumption data for a 1500-gram loading of a laboratory Banbury indicated decreasing power consumption with an increase in the "aromaticity" of the oil in the masterbatch.

2:25 p.m—3. **Effect of Type of Oil Used in Masterbatching of Molecular Structure of Polymer.**[1] W. K. Taft, **J. Duke,** R. W. Laundrie, A. D. Snyder, and D. C. Pram.

The storage stability of masterbatches made with different oils has been shown to vary and can be a serious problem in the case of highly "aromatic" oils. The change in the ratio of Mooney viscosity decrease to dilute solution viscosity decrease has been correlated with the change in the molecular weight distribution of the polymer. In the presence of oils with a higher "aromatic" content, the polymer chain tends to break near the middle of the molecule under certain conditions of treatment; whereas, under the same conditions in the presence of the less "aromatic" oils, the chain breaks near the end of the molecule, yielding a relatively large amount of short chains or low molecular weight material. The tensile strength of the vulcanizates has been shown to correlate with the point of scission, which supports the theory that the short fragments cause low tensile value.

The effects of heating in air and of Banbury treatment of the masterbatches made with various types of oils have been shown. Differences in the rate of chain scission and condensation caused by the character of the oils have been noted, and data presented can be used as a guide to what may be expected from the effect of various processing conditions on the properties of the finished compounds, such as tensile strength.

2:35 p.m.—4. **Factors Influencing Polymer Breakdown.**[1] **W. K. Taft,** J. Duke, A. B. Snyder, D. C. Pram, and H. Mooney.

Heat aging of masterbatches containing a mixture of a processing oil and varied proportions of nitrogen bases, defined by Rostler's method of analysis, results in degradation that becomes more rapid with the addition of greater than about 15% nitrogen bases. These results confirm previous work.

Antioxidants phenyl-beta-naphthylamine and an alkyl phosphite at 1.25% level protected synthetic rubber differently with respect to stability toward heat. Twice this amount of the antioxidants caused the rates of chain scission and condensation of the cold rubber to be increased. Addition of Circosol 2XH and Dutrex 20 to the latex containing 1.25% of the antioxidants caused generally the same chain scission and condensation effects as occurred when the antioxidant levels were increased, but the effects with the two oils were not quantitatively the same; the Dutrex was the more reactive. Data show that there are optimum processing conditions, which probably vary with the combination of polymer, oil, and antioxidant, as well as with the level of each, for producing the minimum amount of short chains in the processed polymer.

Oil-free polymers of different viscosity levels have been shown to differ in their relative heat stability. Agitation of the latex in the presence of air prior to the addition of oil has been postulated as a means of improving the heat and storage stability of the coagulated oil-polymer masterbatches. This postulation has been confirmed by results of heat aging in air and nitrogen.

The presence of hydroperoxides has been shown both to accelerate and to inhibit the breakdown of polymer in masterbatches, depending upon the type of oil present, the conditions of heating or drying, and pos-

[1] The work discussed herein was performed as part of the research project sponsored by the Reconstruction Finance Corp., Office of Synthetic Rubber, in connection with the Government Synthetic Rubber Program.

sibly the previous history of the latex.

Naphthenic acids added to a paraffinic oil caused little change in the heat stability of the masterbatch.

2:55 p.m.—5. **Chromatographic Separation of Rubber-Processing Oils from Petroleum Sources** T. F. Mika, **F. M. McMillan,** S. H. Page, Shell Development Co., Emeryville, Calif.

The increasing acceptance of petroleum source rubber-processing oils in oil-extended synthetic rubber has created a need of more detailed characterization of these products including the development of an analytical scheme which would permit rapid determination of composition.

Others have approached the characterization by determination of physical properties on fractions from either chemical treatment or from partial chromatography. In view of the simplicity of chromatography this method was examined in detail as a means of further characterization of the petroleum source oils. Following the chromatographic examination of several of the most commercially accepted oils a simple method adaptable to routine testing has been devised which permits the complete separation of an oil into several fractions. This separation coupled with the determinations of wax and nitrogen base contents permits a reproducible characterization.

A solvent solution of the rubber-processing oil is adsorbed on a medium of Attapulgus clay over silica gel followed by irrigation of the sorbed solutes by successive portions of isopentane, benzene, acetone-isopropanol and acetone-acetic acid as eluotriants and gives good separation into saturates, aromatics, heterocyclics, and resins fractions. An accurate method for following the course of elutriation with any one solvent is the ultra-violet spectrophotometric examination of the eluate since the appearance of peaks corresponding to the next type of structure gives well-defined end points for the elutriation. Alternatively, the end points can be arrived at more simply and with sufficient accuracy and reproducibility by changing the elutriant as soon as the fraction extracted by any one solvent approaches a minimum (from a determination of solids content).

The proposed chromatographic technique has also been applied in a large enough scale to permit the separation of several pounds of processing oil and a determination of the effects of the separate fractions on a LTP GR-S tread stock.

3:15 p.m.—6. **Petroleum Oil Extenders —Correlation of Properties in GR-S with Chromatographic Analysis. W. L. Dunkel,** F. P. Ford, J. H. McAteer, Standard Oil Development Co., Linden, N. J.

The expanding use of oil-extended GR-S emphasizes the need of improved characterization of petroleum oils and correlation of such data with properties of oil-polymer blends. Laboratory work carried out along such lines is summarized and preliminary conclusions are presented.

Laboratory studies were made to determine the chemical nature of extender oils representing a wide range of crude source and refinery history. This led to the use of a chromatographic method of analysis which is discussed in some detail. Another aspect was the evaluation of the oils, so examined, in actual GR-S compositions. Processability and hysteresis properties of these compounds were measured and analyzed with respect to the oil composition and typical oil properties. Visual examination of pigment dispersion, extrusion behavior, and tensile strength were employed as criteria of processability. Hysteresis properties were determined on a forced vibration-type instrument.

The following conclusions regarding the composition of oil-extenders and the effect of these oils on GR-S may be drawn:

1. Chromatographic methods of analysis afford a rapid and reproducible means of characterizing extender oils. Such analyses provide quantitative estimates of the asphaltene, non-aromatic, aromatic, and polar components.

2. The data obtained by this procedure may be correlated with properties of oil-extended GR-S compositions.

3. An oil having a high aromatic content favors good processability and high tensile values.

4. Oils of low aromaticity impart the best hysteresis.

3:40 p.m.—7. **Superfast 41° F. GR-S Polymerization Recipes. J. R. Miller,** B. F. Goodrich Chemical Co., Cleveland, O.

Very rapid emulsion polymerization recipes have been developed on a quart-bottle scale for the preparation of LTP (cold) GR-S in less than 20 minutes at 41° F. These superfast recipes, which react 50 times as rapidly as conventional commercial cold rubber recipes, were necessary prerequisites for studying the economic feasibility of producing cold GR-S in simple, inexpensive pipeline reactors rather than in the large reaction kettles presently used in synthetic rubber plants. The superfast recipes were made possible by the availability of very active organic hydroperoxides, increased activator, initiator and soap concentrations in the interest of reaction speed, and further refinements of the "redox" polymerization principles which date back to 1940.

Initiator and activator levels employed were five times those normally used in regular cold rubber production, although a level of three times as much was sufficient to yield equally rapid rates. Phenylcyclohexane hydroperoixde at the 3.0-millimole level (per hundred grams of monomers) was the most effective initiator tested. Ferrous pyrophosphate and ferrous silicate at a level of 4.0 millimoles of iron were the most promising activators, with ferrous silicate activator, giving 11 minutes to 60% conversion, compared to 16 minutes for the pyrophosphate.

One all-fatty acid soap (potassium laurate) emulsified recipe and two mixed soap recipes (potassium laurate plus rosin soap) were used as the basis for this study.

4:00 p.m.—8. **Gelation of 41° F. GR-S and Nitrazole CF Initiated (122° F.) Polymer as a Result of High-Temperature Mastication. Glen Alliger,** W. S. Cook, R. D. Wolfangel, Firestone Tire & Rubber Co., Akron.

It was found that 41° F GR-S gels less readily than Nitrazole CF polymer as a result of high temperature mastication in a size B Banbury mixer. However the Mooney plasticity which rises sharply with the formation of large amounts of gel in 41° F. GR-S remained constant or decreased as gelation occurred in Nitrazole CF polymers. These basic differences in the two polymers result in different processing characteristics. But of greater importance is the fact that the formation of polymer gel (in contrast to carbon gel), if it occurs at all readily, will be affected by slight differences in processing conditions, and this will lead to variability in tread tubing properties.

In general, materials found to inhibit gel formation in 41° F. GR-S (hydroquinone, alkyl hydroquinones, certain alkylated phenols, etc.) were also effective in Nitrazole CF polymers, and their use in improving the factory process ability of compounds of the latter polymer is discussed in detail.

Oil-extended, high Mooney 41° F. GR-S, like normal Mooney Nitrazole CF polymers, did not undergo an increase in Mooney plasticity corresponding to the formation of gel at 350° F. The rate at which polymer gel was formed depended upon the type of oil. Polymers extended with the more aromatic type high in "nitrogen bases" were more resistant to high temperature gelation than those extended with "paraffinic" oils.

4:20 p.m.—9. **Physico-Chemical and Rubber Reinforcing Properties of Super Abrasion Furnace Black. J. F. Svetlik,** H. E. Railsback, C. C. Biard, Phillips Petroleum Co., Bartlesville, Okla.

Super abrasion furnace (SAF) black, which became commercially available in 1952, is compared for rubber reinforcing properties in GR-S-1500 and natural rubber with HAF, MAF, and EPC type of blacks at variable black levels. The effects of the blacks on stress-strain, hysteresis, crack growth, hardness, and abrasion properties are discussed. SAF black, because of its high reinforcement potential, gives a greater amount of bound rubber and is superior to other commercial rubber grade carbon blacks in its effect on abrasion resistance. The effect on properties of simultaneously varying the black and softener level in GR-S-1500 is discussed.

Laboratory and factory data show SAF black is somewhat more difficult to process than HAF black. Tire tests have shown that SAF black, when properly compounded, imparts in excess of 40% better tread wear than HAF black. In natural rubber this new black offers superior cut and crack growth resistance.

SAF black is superior to acetylene black in electrical conductivity, and this superiority is most pronounced at low loadings.

THURSDAY MORNING—MAY 28
TECHNICAL SESSION NO. 2—J. L. HASS, HODGMAN RUBBER CO., PRESIDING

9:00 a.m.—10. **The Effect of Carbon Black on the Oxidation of Unvulcanized Cold Rubber. F. Lyon,** K. A. Burgess, C. W. Sweitzer, Columbian Carbon Co., New York, N. Y.

Previous work has shown that the oxidation reactions of statically heated unvulcanized cold rubber and natural rubber films are inhibited by carbon black. The present study extends these investigations to the effect of carbon black on Banbury mixed cold rubber stocks, to the correlation of oxygen uptake at elevated temperatures with the gelation of carbon black-cold rubber films, and to the action of carbon black on the benzoyl peroxide gelation of cold rubber.

Carbon black cold rubber stocks were mixed in the Banbury under the same time and temperature conditions found necessary to develop in the raw polymer the amount of gel previously developed by static heat treatment. In these Banbury mixed stocks carbon black was found to inhibit the oxidation reactions, i.e., gel formation, to the same degree as the static heat method.

The oxygen uptake was determined on gum and black cold rubber films cast from benzene solutions. The carbon black was colloidally dispersed in the black films. The oxygen uptake at elevated temperatures was measured by a volumetric method, and the results were compared to the gelation effects produced in identical films under the same temperature treatment. A good correlation between oxygen absorbed and gel formed was obtained, with the inhibiting effect of carbon black on oxygen absorption proportional to its inhibiting effect on the gelation reaction.

When the oxidation of cold rubber is

carried out with benzoyl peroxide in an oxygen-free atmosphere, carbon black accelerates rather than inhibits gel formation. In natural rubber films under the same conditions carbon black suppresses the formation of polymer gel.

The profound effect of carbon black on polymer oxidation reactions is shown to be influenced by the type of polymer, by the type of oxidizing treatment, and by the chemistry of the carbon surface.

9:20 a.m.—11. **Oxidation and Antioxidant Action in Rubber Vulcanizates.** J. Reid Shelton and **William L. Cox,** Case Institute of Technology, Cleveland, O.

Oxidation studies at different partial pressures of oxygen in combination with nitrogen show that the variation of the rate of oxygen absorption in the constant-rate stage with the oxygen concentration involves both a square root and a first power term, with the latter being negligible in some cases. Rate data for all the stocks studied, including variations of accelerator type, carbon loading, antioxidant type, and antioxidant concentration, can be correlated on the basis of the same rate equation.

A mechanism for the oxidation of rubber which includes a probable mechanism of antioxidant action has been developed in which the antioxidant is considered capable of functioning in more than one way. The proposed mechanism is consistent with kinetic data, as well as offering possible explanations for such "anomalous" facts as: the existence of optimum antioxidant concentrations, the catalysis of light-activated oxidations by substances which are antioxidants in the dark, the difference in effectiveness of phenols and amines in gum and black stocks, and the role of carbon black in the oxidation.

9:45 a.m.—12. **Migration of Materials between Samples in Accelerated Aging Ovens. R. N. Thomson,** N. S. Grace, Dunlop Tire & Rubber Co., Ltd., Toronto, Ont., Canada.

An examination has been made of some effects of interaction between test pieces undergoing accelerated aging in conventional aging ovens.

Migration of material occurs when vulcanizates compounded to different recipes are aged together, and the relative effect of one compound upon another may alter when aged together at different temperatures. Further, the oven itself may become contaminated; the apparent resistance to accelerated aging of a particular vulcanizate then is influenced by the composition of test pieces previously aged in the oven.

Interaction is much reduced if the air is exhausted from the oven after a single pass over the test pieces, even if these are in close proximity.

Complete protection from this source of error is, of course, achieved by aging different compounds in separate isolated containers, each provided with its own air supply, and some of the published test methods incorporating this principle are discussed.

A simple apparatus for converting existing air circulating laboratory ovens for isolated aging of eight or more different compounds is described.

10:10 a.m.—13. **Heat Aging Characteristics of Chlorosulfonated Polyethylene.**[2] **Ward J. Remington,** du Pont.

Chlorosulfonated polyethylene, being a chemically saturated elastomer, possesses excellent resistance to attack by such agents as oxygen, ozone, and oxidizing acids. By virture of this chemical stability, chlorosulfonated polyethylene has also proved to have good resistance to degradation during aging at elevated temperatures. Outstanding heat resistance is obtained by the addition of selected antioxidants.

The elastomer is conventionally cured with metal oxides, preferably litharge or magnesia. The heat degradation of vulcanizates cured with litharge is characterized by a loss of tensile strength and elongation, but the initial hardness and stiffness values remain substantially unaffected. Vulcanizates cured with magnesia are superior to those cured with litharge in tensile strength both before and after heat aging, but aging is characterized by an increase in hardness and stiffness values.

The best overall resistance to heat degradation was obtained by curing chlorosulfonated polyethylene with a mixture of litharge and magnesia. The preferred vulcanizates remained flexible and retained elongation values of about 100% after exposure for six to eight hours at 200° C. (392° F.), 10 days at 150° C. (302° F.), or more than 28 days at 125° C. (257° F.). Extrapolation of the test data leads to the prediction that the service life of chlorosulfonated polyethylene at 125° C. may be expressed in terms of months, and at 100° C. the service life may be measured in years.

10:30 a.m.—14. **The Structure of Neoprene. VII. Infrared Analysis of Configuration. J. T. Maynard** and W. E. Mochel, du Pont.

A study of the infrared absorption spectra of polychloroprenes made at temperatures ranging from 40 to 100° C. has made possible identification and estimation of the major structural features of these polymers. It is confirmed that 1,4 polymerization of chloroprene accounts for the greatest part of the structure of all neoprenes, ranging from 99% in—40° C. polymers to ca. 84% in 100° C. polychloroprenes. Of this 1,4 polymer only a small fraction has the *cis* configuration. This proportion increases from less than 5% in —40° C. polymer to ca. 13% in 100° C. polymer.

Small amounts of branched structures that result from 1,2 and 3,4 polymerization are observed. These also increase in concentration with higher polymerization temperatures, but do not account for more than 2.5% each even in 100° C. polychloroprenes. The portion of these polymers unaccounted for by these observations amounts at the most to 10% in 100° C. polymers. It is suggested that this part of the structure is that formed by hydrolysis and/or rearrangement of a part of the tertiary allylic chloride units which result from 1,2 polymerization of chloroprene.

It is shown that only 50% of an acid-catalyzed ionic polychloroprene can be accounted for by structures recognized in free-radical polychloroprenes.

10:55 a.m. **Business Meetings.** S. G. Byam, presiding.

11:15 a.m.—15. **Chemigum SL, An Elastomeric Polyester-Urethane. N. V. Seeger,** T. G. Mastin, E. E. Fauser, F. S. Farson, E. A. Sinclair, Goodyear Tire & Rubber Co., Akron.

Chemigum SL is an elastomeric polyester-urethane made by condensation polymerization of a low molecular weight polyester adipate with a diisocyanate. A high polymer results having a molecular weight in the range 20-50,000. It is a processible raw gum which has many of the processing characteristics of pale crepe rubber. Intrinsic viscosity ranges from 1.0-2.0; gel 0-10%.

The effect of the molar ratio of diisocyanate to polyester (R value) on sol-gel, plastic flow, softening point, and Mooney will be discussed.

Starting materials for the polyester are usually ethylene glycol, propylene glycol, and adipic acid. Many variations in the type and amounts of glycols and di-basic acids are possible in the polyester fragment of the polymer. The polyester in turn can readily be chain extended with one or more of several diisocyanates preferably derived from benzidine, 1:5 naphthalene diamine, 4:4′ diamino-diphenyl methane, and 2,4 tolylene diamine.

Usually di and/or polyisocyanates serve as curing agents and usually are added on the mill. Cured blends are possible with natural rubber, GR-S, and neoprene. Since the raw gums are readily soluble in methyl ethyl ketone, chlorinated aliphatics, and esters, they lend themselves to cement compounding and find use as protective coating on rubber, plastics, and fabrics. A solution of Chemigum SL sprayed on the surface of rubber or plastic gives an adherent, flexible, and scuff resistant coating which is at the same time resistant to sunlight, ozone, and general weatherng.

A typical gum vulcanizate has the following properties: tensile, 5,000 psi.; elongation, 750%; abrasion resistance twice as great as the best cold rubber; excellent heat resistance; outstanding oxidation resistance; and oil resistance equivalent to that of neoprene. Cured physicals are similar to Vulcollan.

Potential uses include wear-resistant tread veneers on pneumatic tires. Solid tires made from Chemigum SL have given service four or five times longer than conventional solid tires. Soles, heels, belt surfaces, floorings, etc., may be protected by localized application of wear-resistant Chemigums of the SL type.

11:45 a.m.—16. **Compounding Neoprene for Increased Resistance to Water. C. E. McCormack,** R. H. Baker, R. S. Graff, du Pont.

Both laboratory tests and field experience have shown that conventional neoprene compounds have adequate water resistance for most types of service. Increased water resistance results from (1) the use of red lead as the vulcanizing agent and (2) the use of fillers such as hydrated calcium silicate or fine-particle silica in compounds containing zinc oxide and magnesium oxide as the vulcanizing agents. Tests have shown that compounds containing red lead possess sufficient processing safety to be applicable to most factory operations. The water resistance of these compounds is influenced by amount and type of filler. Certain types of carbon black give the best results, and calcium carbonate the poorest. Zinc oxide-magnesium oxide compounds containing either hydrated calcium silicate or fine-particle silica differ from all other compounds tested in that their swelling curves go through a maximum. This point may be of value in designing compounds for extra-severe service.

Data are presented on the effect of temperature in the range of 25 to 121° C. on the swelling characteristics of many neoprene compounds. The relation between distilled water and various aqueous solutions as the swelling media for neoprene stocks has been investigated, and it is shown that distilled water is the most severe, and that for the solutions studied, swelling varies inversely with the concentration. Some comparisons of various neoprenes with natural rubber and GR-S are shown.

THURSDAY AFTERNOON—MAY 28

Plant Visits. Ford Motor Co., Somerville; **Dewey & Almy Chemical**

[2] Marketed as "Hypalon" chlorosulfonated polyethylene. "Hypalon" is a registered trade mark of E. I. du Pont de Nemours & Co., Inc.

Co., Cambridge; **Boston Woven Hose & Rubber Co.**, Cambridge; **Simplex Wire & Cable Co.**, Cambridge; **Hood Rubber Co.**, Watertown; **the new Cabot Laboratories**, Cambridge.

7:00 p.m. **Rubber Division Banquet**—Hotel Statler.

FRIDAY MORNING—MAY 29

TECHNICAL SESSION NO. 3. A. W. BRYANT, BINNEY & SMITH CO., PRESIDING

9:00 a.m.—17. **Fundamental Low-Temperature Retraction Studies of Natural and Synthetic Elastomers.** L. J. Radi and **N. G. Britt,** Interchemical Corp., New York.

The low-temperature retraction behavior of various elastomers was observed over a wide range of temperatures. Contrary to the more common type of retraction test (T-R), in which retraction is measured at continually rising temperature, retraction was measured at constant temperature, and the % retraction plotted against the temperature at which retraction occurs.

The resulting curves were typically sigmoid for GR-S, but it was found that almost all other elastomers exhibit a deviation from the sigmoid norm. Evidence presented shows that the magnitude of this deviation or "dip" is an indication of the rate at which crystallization is occurring at a specific temperature. The magnitude of deviation can be radically altered by modification of the polymer and even by compounding variations.

The temperature of maximum deviation has been designated as T_d and was determined for several elastomers. T_d was observed to fall in a fairly narrow range (−35 ±5° C.) for all elastomers and was not appreciably affected by polymer modification or compounding variations. T_d is believed to represent optimum thermal conditions for crystallization.

The magnitude of deviation or "dip" is shown to be of value in following polymer and compounding modifications to achieve maximum resistance to crystallization; while T_d serves to indicate the temperature most favorable to crystallization and most to be avoided in storage.

9:20 a.m.—18. **Determination of Particle Size Distribution in GR-S Latices. A. Nisonoff.** W. E. Messer, L. H. Howland, United States Rubber Co., Naugatuck Chemical Division, Naugatuck, Conn.

A method based on Stokes' Law, involving the use of an ordinary laboratory centrifuge, is described for the determination of particle size distribution in GR-S latices. It was shown to be valid by tests for reproducibility and by comparison with the results of light and electron microscopy. In applying the method, several unusually fluid high-solids latices made in the pilot-plant were found to be characterized by a wide distribution of particle sizes. Data on various latices in plant production are reported. The technique was used to study the mechanism of formation of the very large particles which constitute the cream formed in some "cold" high-solids latices.

9:45 a.m.—19. **Rheology of Latex and Latex Compounds. Louis Leaman,** Magic Chemical Co., Brockton, Mass.

The rheological properties of latex systems are of importance in their industrial applications. Many practical methods are used for controlling or varying flow properties. The flow behavior of latex systems must be explained in the light of their colloidal properties. Of utmost importance are the conditions existing at the interface between the dispersed particle and the serum. Rheological properties are also closely related to colloidal stability.

Studies in the writer's laboratory show the value of determining rheological properties with a rotating cylinder (Couette) type of viscometer. Flow curves, or rheograms, are very helpful in control work and product development. Typical rheograms are illustrative of the various problems encountered in the latex laboratory. All types of rheological behavior are exhibited in latex systems.

For purposes of studying the physicochemical principles involved, this work may be divided into two parts: (1) uncompounded latices and (2) lastex compounds. In uncompounded latices, a gradual change in flow properties may be traced as the concentration of elastomer is varied. Two types of additives may be present in latex compounds: (1) those used to control the rheological properties and (2) those used to impart desired properties in the end-product of the manufacturing process. Additives of the second type may also produce rheological effects.

10:10 a.m.—20. **A Paper Dip Method for Measuring Wet Gel Strength of Coagulant Dipped Films. A. I. Medalia** and H. B. Townsend, Boston University.

A property of latex considered of fundamental importance in the latex industry is the so-called *wet gel strength.* This term connotes the tensile strength of the freshly set film; but hitherto there has been no adequate method of measurement of this property, since the film is so weak that it cannot readily be removed from the surface on which it is deposited.

The present method is based upon the use of absorbent paper of low wet strength, impregnated with calcium nitrate, as a base for the deposition of a latex film. The strip of paper, which may be in a dumbbell shape, is dipped for 30 seconds and then removed from the latex, together with the adhering coagulant dipped film. This film is rinsed in water and then mounted on a special tensile testing machine designed for high elongation and low tensile. Elongation and tensile are measured at a standard rate of jaw separation of 20 inches a minute.

These properties have been studied, using natural and various synthetic latices. The effects of prevulcanization, compounding, and dilution of these latices have been determined. Tensile properties of the film from a given latex have also been measured as a function of the time and conditions of drying of the film after deposition.

10:30 a.m.—21. **Aging Stability of Neoprene Latex. D. E. Andersen** and R. G. Arnold, du Pont.

The most important cause of aging instability in neoprene latex is the slow appearance of hydrochloric acid in the aqueous phase. This acid destroys an alkaline reserve and eventually attacks the protective emulsifying agent. At ordinary temperatures these reactions occur over approximately an 18-month period before irreversible coagulation appears. During this time the pH of the latex decreases, and at some point previous to flocculation the latex cannot be compounded satisfactorily unless its pH is again raised with sodium hydroxide.

A study was made of the rate of HCl appearance at 90° C. in Type 571 neoprene latex, and the changes in the composition of the aqueous phase which result. A method for predicting the storage life of a latex, with or without added caustic, is developed, using the rate of acid appearance and a graph showing the changes in composition tolerated by the latex. The use of this information in practical application and the difficulties involved are also discussed.

10:55 a.m.—22. **Titer Compounding of Neoprene Latex. G. S. Cook** and J. C. Fitch, du Pont.

All latices become less stable upon aging. This decreased stability becomes a problem long before spontaneous coagulation of the latex occurs. Generally, it is first manifested in a decreased stability toward compounding which is characterized by thickening, flocculation, or coagulation occurring either immediately upon or shortly after the addition of compounding ingredients.

With neoprene latex, this loss of stability upon aging has been shown to be related to a reduction in alkalinity. Data presented show that the titer of the latex to pH 10.5 obtained by titration under controlled conditions, has considerable practical value in the formulation of neoprene latex compounds. Experiments are described which show that proper adjustment of this titer results not only in improved stability of neoprene latex compounds, but also, when applied to uncompounded latex, can serve as a basis for extending its useful life.

11:15 a.m.—23. **The Relation between soluble Polymer in Chloroprene Monomer and the Mechanical Stability of Neoprene Latex.** N. G. O'Brien, **J. R. Goertz,** R. A. Hammond, du Pont, Louisville, Ky.

It has been observed that when neoprene latex is submitted to mechanical action, a small portion may coagulate. Because of this partial instability, coagulation sometimes occurs in lines and tanks during transfer of the latex.

It was shown that soluble polymer in chloroprene monomer, formed during storage, gives rise to the unstable particles in latex emulsion through the following mechanism. During emulsion polymerization the monomer diffuses from the dispersed droplets into soap micelles where polymerization takes place. The polymer particles thus formed have a diameter of about 0.1-micron. Any soluble polymer, formed during storage of monomer, cannot diffuse from the droplets and is left behind as skeletal residues. These residues can be several hundred times as massive as normal polymer particles. Because of size they are more likely to form coagulum upon collision with other particles.

Quantitative experimental evidence to support this mechanism has been obtained. Furthermore, a dye tracer technique has provided visual confirmation. It has been demonstrated that the stability of polymer dispersions can be improved by reducing the concentration of soluble polymer and by increasing the degree of monomer emulsification. The results of this work have been applied to improve the manufacture of neoprene.

Summer Courses in Polymers

THE tenth annual series of summer laboratory courses has been announced by Polytechnic Institute of Brooklyn, sponsored by the Institute of Polymer Research and the Graduate School of Physics. Three courses will be given, each including laboratory and lecture periods, as follows: June 1-12, "Industrial Applications of X-Ray Diffraction"; July 27-31, "Weight and Shape of Macromolecules in Solution, Including Polyelectrolytes"; and August 3-7, "Progress in Polymerization and Copolymerization Techniques." Further information may be obtained by writing Professor I. Fankuchen, Polytechnic Institute of Brooklyn, 85 Livingston St., Brooklyn 1, N. Y.

Canadian Rubber Division Meets June 5 at Windsor

THE Division of Rubber Chemistry of the Chemical Institute of Canada will hold a one-day meeting at Windsor, Ont., Canada, on June 5, as part of the meeting of the Institute scheduled for June 4, 5, and 6.

About 1,000 chemists and chemical engineers are expected to attend the annual conference of the Institute. Among the special events will be the presentation to an outstanding Canadian scientist of the Chemical Institute of Canada Medal, the Westman Memorial Lecture, plant tours, and a golf tournament. R. S. Jane, vice president of Shawinigan Chemicals, Ltd., Montreal, P.Q., is this year's president of the Institute.

The Rubber Division has scheduled a program of eight papers beginning at 9:30 a.m. the morning of Friday, June 5, according to T. L. Davies, Polymer Corp., Ltd., chairman of the Division. Four papers will be presented in the morning, and four in the afternoon. The annual business meeting of the Division will be held between 11:30 a.m. and noon.

At 7:00 p.m. on June 5 the Rubber Division will hold a banquet at which an address will be given by S. M. Cadwell, United States Rubber Co.

On Saturday, June 6, Polymer Corp. and Cabot Carbon of Canada, Ltd., will jointly sponsor, for Rubber Division registrants only, a bus trip from Windsor to Sarnia for the purpose of touring the Polymer and the Cabot plants.

Abstracts of Papers To Be Presented

Rubber Cements. F. H. Jankowski, Minnesota Mining & Mfg. Co. of Canada, Ltd., London, Ont. (Title not exact; no abstract available.)

Impact of Man-Made Fibers on the Rubber Industry. J. W. Illingworth, Dunlop Tire & Rubber Goods Co., Birmingham, England.

Man-made fibers have now almost completely replaced natural fiber cotton in tire casings and are making inroads into belting and other sections of the rubber industry. High-tenacity viscose rayon is, at the moment, by far the most important fiber, but the synthetic fibers, nylon and Terylene (polyethylene terephthalate), with their very high tenacities are likely to become increasingly important.

The introduction of these synthetic fibers was not accomplished without encountering certain difficulties. The growth of nylon in use seriously limited its applications, and nylon and Terylene both show a tendency to shrink on heating, leading to serious difficulties in such processes as curing. Special machinery has had to be devised for the heat treatment of fibers as the tensions that must be maintained are well outside the range of normal textile machinery. Poor adhesion to rubber, particularly in the case of Terylene, has been another serious problem.

A further interesting development is that of the very high-tenacity rayons that are appearing in several countries and which are considerably stronger than the standard industrial rayon yarns. These new high-tenacity rayons are considerably stronger than the standard industrial rayon yarns. These new high-tenacity rayons are considerably stronger than standard industrial rayon yarns and are likely to be of special interest in meeting the ever-increasing demands of the rubber industry, because these new rayons may be processed in a similar manner to the standard rayons and have not, therefore, the serious disadvantages of nylon and Terylene.

Versalite—A Typical Thermoplastic Rubber-Resin Composition. O. R. Huggenberger, Dominion Rubber Co., Ltd., Montreal.

Versalite is a new material, belonging to the general class of thermoplastic rubber-resin compositions. The union of these two materials has opened an entirely new range of properties hitherto unattainable with a single component rubber or plastic member, the foremost feature of which is a combination of remarkable toughness and high impact strength. Versalite has a board-like consistency which points to its obvious utility in the ever-growing field of structural application.

While there are probably an infinite number of rubber-resin systems depending on the individual components and the ratio in which they are combined, each system gives rise to its own unique set of properties. The empirical study of such systems is far in advance of the theoretical aspects, and it is not yet possible to predict accurately the properties of a particular rubber-resin blend.

The family of materials known as Versalite represents one of these systems which has been investigated thoroughly, and it will indicate what can be achieved through the judicious choice of materials.

It has, for example, a notched Izod impact value of approximately 10 foot-pounds, roughly 20 times better than that of such materials as regular polystyrene, hard rubber, methyl methacrylate, melamine formaldehyde, etc. It has a Rockwell "R" hardness of 95-105, which places it in the category of hardboard materials. Its water absorption is low. Versalite is resistant to hydrochloric, hydrofluoric, phosphoric, nitric (10%), and sulfuric (50%) acids. It is also resistant to many common alkalies, but will not resist ketones, esters, aromatic hydrocarbons, and chlorinated solvents.

Versalite can be mixed on open mills or in Banbury mixers, and the general mode of handling the material is closely allied to that of rubber. Forming methods are relatively simple, and equipment costs are low.

Not to be ignored is the contribution which materials of this type are making in the field of piping. The strength features, coupled with chemical resistance, will create an ever-increasing demand to supplement the more conventional metallic units of long standing.

Properties and Performance of Super Abrasion Furnace Blacks. Fred H. Amon and Harry J. Collyer, Godfrey L. Cabot, Inc., Boston, Mass.

Super abrasion furnace (SAF) blacks are the latest products of carbon black technology. This type of oil black, as the name implies, imparts to rubber compounds extremely high resistance to abrasive wear. The furnace process, using liquid fuels, has now provided a wide range of products from the semi-reinforcing category through the fine particle size super abrasion types. Widespread manufacture and use throughout the world of high abrasion furnace (HAF) blacks suggest the logic of comparing HAF and SAF blacks, although channel black is still important in many applications.

The chemical and physical characteristics of SAF blacks are described. Results of electron microscope examination are presented. Rubber test data on laboratory and factory mixed stocks confirm the enhanced performance predicted by the analytical and microscopic examination. Results of factory processing and road tests of SAF blacks in natural rubber, LTP GR-S, and oil-extended GR-S tires are presented. Besides consideration of road wear, analysis is made of the effect of SAF blacks with respect to cracking.

Compounding with SAF black furnishes a high degree of electrical conductivity as well as extreme resistance to abrasive wear, and tensile strength is substantially higher than that obtained with HAF black. In common with HAF black, SAF black is superior to channel black in extrusion characteristics.

While the SAF black development is linked closely with the use of synthetic rubbers, substantial amounts are used in large-size truck and bus tires based on natural rubber. Compounding techniques with natural rubber and synthetic rubber are described. SAF black in latex masterbatch, in camelback, and in oil- and rosin-extended GR-S is treated briefly.

Although it is most widely used in automotive tire tread compounds, the use of SAF black is indicated for other products requiring maximum resistance to wear.

Theoretical Approach to the Design of Rubber-Oil-Black Masterbatches. S. C. Einhorn and L. A. McLeod, Polymer Corp.

The classical stress-strain equation for rubber-like elasticity has been extended to apply to polymers optimally reinforced by carbon black and also to stocks incorporating large quantities of non-polymeric extenders. The modified equation has been used to predict the permissible extent of dilution of a high molecular weight polymer which is to have tensile strength and modulus equivalent to those of a given reference polymer, for example, GR-S.

Above a molecular weight of 500,000, marginal increases in the amount of diluent are shown to compensate for unlimited increases in polymer molecular weight for constant tensile properties. In the range of high molecular weight, it is shown that more diluent is required to achieve ease of processability than can be tolerated for any practical levels of modulus or tensile strength.

Rubber as It Is Used in the Modern Automobile. J. C. Macdonald, Chrysler Corp. of Canada, Ltd., Windsor.

This paper gives a summary of the number and the type of rubber parts required in building the modern automobile and illustrates the increase in usage of rubber in recent years. The important general requirements of non-functional parts and the specific requirements of functional parts, both oil and non-oil resistant, are discussed.

Production problems, as related to material and assembly and their control by means of engineering specification and quality checks, are outlined.

The paper concludes with a brief résumé of some of the basic research and development being done, which is of particular interest to the automobile industry.

Blends of Rubbers and Resins. R. C. Bascom, B. F. Goodrich Chemical Co., Cleveland, O.

Although rubber compounders have been using blends of rubbers and resins for many years to obtain special properties in rubber compounds, the expansion of the synthetic rubbers and resins during the 1940 decade resulted in several new blends, many of which have achieved commercial importance.

This paper offers a review of the present status of such blends as nitrile rubbers with phenolic, polyvinyl chloride, and styrene acrylonitrile resins as well as the use

of styrene-butadiene resins as reinforcing agents for general-purpose rubber.

Chemigum SL, the New Goodyear Polyester Rubber. N. V. Seeger, Goodyear Tire & Rubber Co., Akron, O.

Chemigum SL is an elastomeric polyester urethane made by reacting a linear alkyd resin with a diisocyanate. Condensation polymerization proceeds until a processable raw gum is produced which has many of the characteristics of pale crepe. Cured Chemigum SL is chemically similar to Vulcollan, recently announced by O. Bayer, of Farbenfabriken Bayer Co., Leverkusen, Germany. Raw materials are ethylene glycol, propylene glycol, and adipic acid which are condensed to a low molecular weight polyester. This is, in turn, chain extended with one or more of several diisocyanates preferably derived from benzidine, 1,5 naphthalene diamine, 4,4' diamino diphenyl methane, and 2,4 tolylene diamine.

The raw polymer can be compounded in a manner similar to hydrocarbon rubbers. Additional di- or polyisocyanate is added on the mill. A cured gum vulcanizate can be obtained by molding under pressure, giving physical properties comparable to natural rubber tread stock. Typical properties are: tensile strength, 5,000 psi.; elongation, 700%; abrasion resistance twice as great as that of rubber; excellent heat resistance; outstanding oxidation resistance; and oil resistance equivalent to that of neoprene. No sulfur is used as a curative, since no unsaturation exists in the polymer.

Potential uses include wear-resistant tread veneers on passenger and truck tires. Solid tires made from Chemigum SL have given service four to five times longer than conventional solid tires. Soles, heels, belt surfaces, floorings, etc., may be protected by localized application of wear-resistant Chemigums of the SL type.

The raw gum is soluble in a variety of solvents such as methyl ethyl ketone, chlorinated aliphatics, and esters. Thus these polymers lend themselves to cement compounding and rubber cement applications. A solution of Chemigum SL sprayed on the surface of rubber or plastic gives an adherent, flexible, and scuff-resistant coating which is at the same time resistant to sunlight and ozone and also to general weathering.

Technical and Social Sessions Feature Rubber Division, A. C. S., Los Angeles Meeting

APPROXIMATELY 210 persons registered for the sixy-second meeting of the Division of Rubber Chemistry, American Chemical Society, held at the Hotel Statler, Los Angeles, Calif., on March 18 and 19 in conjunction with the one hundred twenty-third national meeting of the parent Society.

The Division meeting comprised three technical sessions, the first on the afternoon of March 18, and the others on the morning and the afternoon of March 19. Abstracts of the 20 technical papers presented at these sessions appeared in our February issue, page 658.

A. R. Hromatka

Officers, Directors, and Past Chairmen of the Rubber Division attending the "Old Timers" Luncheon in Los Angeles included: (Front Row, L. to R.) F. H. Banbury, Farrel-Birmingham Co.; Harry L. Fisher; S. G. Byam; J. C. Walton, Boston Woven Hose & Rubber Co., and R. E. Hutchinson. (Second Row) E. R. Bridgwater, du Pont; A. W. Oakleaf, Phillips Chemical Co.; R. B. Stringfield, Fullerton Mfg. Co.; C. E. Bradley, California Institute of Technology; and A. R. Kemp, Consultant; and (Rear Row) H. E. Outcault, Retired; C. R. Haynes, Binney & Smith Co.; Ira Williams, J. M. Huber Corp.; N. A. Shepard, Calco Chemical Division of American Cyanamid Co., and E. B. Curtis, R. T. Vanderbilt Co.

A. R. Hromatka

Charles A. Lamb, Sr. (Center) Receives Gift in Token of His 56 Years in the Rubber Industry from R. E. Hutchinson (Left) as S. G. Byam Looks on. Presentation Was Made at the "Old Timers" Luncheon

Following the registration an informal "Old Timers" luncheon was held March 18, attended by a congenial group of 175 persons. It was found that the person attending with the longest period of service in the rubber industry was Charles A. Lamb, Sr., Lamb Rubber Corp., with 56 years. Mr. Lamb was presented with a gift in recognition of his outstanding record. Remarks were also made by S. G. Byam, E. I. du Pont de Nemours & Co., Inc., and Division chairman, and by R. E. Hutchinson, Firestone Tire & Rubber Co. of California, who was in charge of arrangements for the luncheon.

On March 19, The Los Angeles Rubber Group, Inc., held an informal luncheon at the Town & Gown Club, University of Southern California. Guests included officers of the Division, University faculty members, A. C. S. officers, and members of the Group's educational committee and Rubber Foundation. The luncheon was designed to acquaint the guests with the founding and development of the Foundation's rubber technology program sponsored jointly by the Group and the University. There was a short talk by Albert S. Raubenheimer, of the University, on the interrelation of industry and education; and Harry L. Fisher, Foundation director of education and research and A. C. S. president-elect, spoke briefly on the Foundation's present and future plans. There were also short remarks by Mr. Byam and A. C. S. President Farrington Daniels, University of Wisconsin.

The Divisional banquet was held at the Los Angeles Breakfast Club on the evening of March 19, with some 280 persons attending. Following the dinner, Mr. Byam introduced the people at the head table and then spoke briefly on the activities of the Division and the Los Angeles Group. There was no offical business transacted, and the remainder of the evening was given over to a lively entertainment program.

H. E. Thompson, director of research, Anaconda Wire & Cable Co., Hastings-on-Hudson, N. Y., will be a panel member at a discussion entitled, "What Is the Quality Control Job," on May 27. This panel will be part of the program of the seventh annual convention of the American Society for Quality Control to be held May 27-29 in Philadelphia, Pa.

High Polymer Division, APS, Annual Meeting

THE Division of High Polymer Physics of the American Physical Society held its annual meeting in conjunction with the parent Society on March 26-27 at Duke University, Durham, N. C., and March 28 at the University of North Carolina, Chapel Hill. Attendance ranged between 150 and 200 at the Division meeting, which consisted of morning and afternoon sessions on March 26 and 27, a morning session on March 28, and the annual business meeting on March 26.

New officers of the Division, elected by letter ballot, were announced at the business meeting, as follows: chairman, R. F. Boyer, Dow Chemical Co.; vice chairman, John D. Ferry, University of Wisconsin; and secretary, W. J. Lyons, Firestone Tire & Rubber Co.

A total of 25 papers, of which nine were invited and 16 were contributed, was presented at the technical sessions. A list of the papers and authors, together with brief abstracts of the contributed papers, is given below:

THURSDAY, MARCH 26

"The Reinforcement of Silicone Rubber," A. M. Bueche, General Electric Co.

"Sedimentation Rates in Dilute and Moderately Concentrated Polymer Solutions," M. Wales, National Bureau of Standards. Data given show that the constant which describes the dependence of sedimentation on concentration in dilute solutions is related to intrinsic viscosity.

"Nucleoprotein Monolayers," A. B. Amster and Q. Van Winkle, Ohio State University. A sensitive Wilhelmy apparatus was used to study nucleoprotein monolayers. Results are discussed, and a hypothesis is offered to relate molecular weight variations with spreading concentration.

"The Dependence of the Photoelastic Properties of GR-S on the Degree of Cross-Linking," G. R. Taylor and S. R. Darin, Mellon Institute. The relationship of birefringence and stress for certain GR-S vulcanizates is determined as a function of the degree of cross-linking.

"Stress Crazing Thresholds of Methyl Methacrylate Polymers," T. F. Protzman, J. J. Gouza, and W. F. Bartoe, all of Rohm & Haas Co. The crazing threshold strain is found to be a linear function of the applied stress. Results of these measurements are interpreted on the basis of polymer rheology.

"Rheology of Polyisobutylene. III. Approximation Methods in Linear Viscoelasticity Theory; Wiechert Function Calculations," Herbert Leaderman, Bureau of Standards. Results are given of a study made of the validity of approximation methods in the calculation of the retardation time function and the dynamic response from creep data.

"Dynamic Mechanical Properties of Polyisobutylene," E. R. Fitzgerald, Pennsylvania State College, and L. D. Grandine, Jr., and J. D. Ferry, both of the University of Wisconsin. Data presented provide a complete description of the dispersion region in polyisobutylene corresponding to the transition from an elastic material to a hard, glassy-like state.

"The Relaxation Distribution Function of Polyisobutylene in the Transition from Rubber-like to Glass-like Behavior and Its Dependence on Temperature," Ferry, Grandine, and Fitzgerald. The distribution functions of relaxation and retardation times are shown to be similar in shape to those of other polymers in the transition stage.

"Dynamic Properties of Unvulcanized GR-S," L. J. Zapas, S. L. Shufler, and T. W. DeWitt, all of Mellon Institute. Dynamic moduli and loss factors have been measured at temperatures between —68 and +63° C. These data are compared with stress relaxation measurements reported in the literature.

"Dynamic Properties of Concentrated Polymer Solutions," F. J. Padden, H. Markovitz, and T. E. DeWitt, all of Mellon Institute. The dynamic rigidities and viscosities of a variety of solutions of polyisobutylene in decalin at room temperature have been determined at frequencies between 10 and 100 cycles per second.

"Calculation of Extrusion Behavior of Viscoelastic Materials from the Relaxation Distribution Function," T. L. Smith, Hercules Powder Co. An equation is derived which expresses the effective viscosity as a function of the transit time and the distribution function of Maxwellian relaxation times.

"Dielectric Relaxation in a Styrene-Acrylonitrile Copolymer burning and after Its Polymerization," P. Ehrlich and N. J. DeLollis, NBS. Changes in dielectric constant and loss during polymerization are interpreted as resulting from the relaxation of the nitrile groups at a rate depending on extent of polymerization.

"Dielectric Dispersion of Polar Polymers at Microwave Frequencies," T. M. Shaw and J. J. Windle, Western Regional Research Laboratory, United States Department of Agriculture. The dielectric properties of wool and mohair are investigated by means of a cavity resonator method.

"Relaxation Distribution Functions of Polymers and Their Concentrated Solutions and Gels," Dr. Ferry.

FRIDAY, MARCH 27

"Equilibrium Theory of Crystallization," P. J. Flory, Cornell University.

"Kinetics of Crystallization," Leo Mandelkern, NBS.

"Recent Work on the Structures of Crystalline Polymers," C. W. Bunn, Imperial Chemical Industries, Ltd.

"X-Ray and Infrared Studies on the Extent of Crystallization," J. B. Nichols, E. I. du Pont de Nemours & Co., Inc.

"Relations between Crystallization and Second-Order Transition," Dr. Boyer.

"Molecular Structure and the Crystallizability of Polymers," Dr. Bunn.

"Orientation in Polymeric Films by Infrared and X-Ray Techniques," W. H. Cobbs, Jr., S. B. Cole, and R. L. Burton, all of du Pont. Quantitative estimation of degree of orientation of polymeric films by a Weissenberg X-ray technique is shown to give results in general agreement with those obtained by absorption of polarized infrared light.

"Crystallization in Butadiene-Styrene Copolymers," L. A. Wood, NBS. Data presented support the hypothesis that crystallization in these copolymers requires a certain minimum content of trans-1,4-polybutadiene units.

"The Melting Transition of Natural Rubber," D. E. Roberts and Dr. Mandelkern, NBS. The effect of crystallization temperature on the melting temperature of purified natural rubber is shown to be considerably smaller in magnitude than previously thought.

"An Infrared Study of the Crystallization of Polyethylene," Alexander Brown and F. P. Reding, Carbide & Carbon Chemicals Co. Infrared measurements are made of the melting points and temperatures for the onset of crystallinity of a series of resins varying in molecular weight and degree of chain branching.

SATURDAY, MARCH 28

"Statistical Mechanics of Polymer Chains in Solution," B. H. Zimm, G-E.

Quality Control Discussed

THE subject of statistical quality control was discussed at a meeting of the New York district of the ASTM held in collaboration with the Metropolitan Section of the ASQC in the Engineering Societies Bld., New York, N. Y., on April 16. Simon Collier, of Johns-Manville Corp., was the principal speaker of the evening. He spoke briefly on the history of industrial quality control in general, and at his corporation in particular, and stressed that no quality control program can succeed without effectively planning and selling the program to production and engineering groups within the plant. Mr. Collier then showed a sound color film which J-M uses to train employes in the basic principles of the subject. The film emphasized that proper interpretation of control charts and adequate sampling plans are the fundamental requirements of a sound quality control program.

The remainder of the meeting consisted of a discussion of questions raised by members of an audience of approximately 100 persons. The panel was composed of the speaker; A. B. Mundel, Sonotone Corp.; Enoch B. Ferrell, Bell Telephone Laboratories, Inc.; and Ellis R. Ott, Rutgers University.

SORG Meets

THE spring meeting of the Southern Ohio Rubber Group took place April 6 at the Engineer's Club of Dayton, with 76 members and guests attending. The meeting included a cocktail hour, dinner, and business and technical sessions and was followed by an informal get-together at the Miami Hotel, Dayton. In the business session, the retiring chairman, Jack E. Feldman, Inland Mfg. Division, General Motors Corp., thanked his officers and committeemen for their work during the past year and then presented the new chairman, George E. Lang, Johnson Rubber Co. Mr. Lang introduced his fellow officers and committee chairmen for the coming year. Tentative plans were discussed for the Group's forthcoming annual outing on June 6, fall meeting on September 17, and annual Christmas party on December 12.

The technical session featured a talk on "Developments in Chemical Protection of Rubber against Ozone Attack" by M. C. Throdahl, Monsanto Chemical Co. The speaker discussed the development of rubber chemicals used for ozone protection and their methods of application.

Second Armed Forces Symposium on Low-Temperature Testing of Rubber[1]

ON FEBRUARY 3, 1953, personnel responsible for rubber materials, representing various branches of the Armed Forces, held their second meeting at the Pentagon to discuss the progress made on the standardization of methods and test equipment for use in military procurement specifications for rubber items intended for low-temperature applications. At the first symposium held in March, 1952, the use of the following low-temperature tests and the related apparatus was agreed upon:

Brittleness Test: The ASTM D746 (motor or solenoid actuated).
Hardness Test: The Pusey & Jones plastometer or Admiralty indentometer as specified in Federal Specification ZZ-R-601.
Stiffness Test: The Gehman apparatus.
Elastic Recovery: Compression set, temperature-retraction, or tension recovery apparatus.

During the past year the various activities of the Army, Navy, and Air Force reviewed and continued the study of the above test methods and equipment. The ASTM Method D746 brittleness test has been incorporated into the latest revision of Military Specification MIL-R-3065, and the bending beam stiffness test method of Federal Specification ZZ-R-601 has been eliminated from Military Specification MIL-R-900.

Brittleness Testing

ASTM Method D746 for brittleness testing was discussed by those present, and the difficulties encountered using the solenoid operated apparatus were brought out. One laboratory, using this apparatus, presented data showing the effect of the number of test specimens on the brittle point determined. It was shown that when from one to three specimens were tested simultaneously, there was no change in the brittle point; but when four or more specimens were tested at one time, the brittle points determined were lowered. Also discussed were the variations in the force applied to the samples when using the solenoid operated method, apparently caused by voltage variations. It was agreed that additional study of the two instruments, solenoid and motor driven, was desirable, and that the Armed Forces laboratories should collaborate with Sub-Committee XXV of ASTM Committee D-11 in arriving at a satisfactory test method.

Hardness Testing

The Admiralty indentometer hardness tester, as specified in the revision of Federal specification ZZ-R-601, soon to be issued, was agreed upon as being more desirable for testing rubber hardness at low temperatures because of some difficulties encountered when using the Pusey & Jones instrument at these temperatures. Several laboratories indicated their desire to obtain indentometer instruments, but because there is no commercial supplier of the instrument, they have been hindered in doing so. It was proposed to determine the possibility of developing a commercial source of supply for the Admiralty indentometer, which is the New York Naval Shipyard Material Laboratory's modification of the British Admiralty rubber meter.

Stiffness Testing

As regards the stiffness test, the Gehman instrument is currenly being used by a number of the Armed Forces laboratories to gather data for specification use. In the past year more laboratories have received or have built Gehman instruments and are obtaining data for comparison with older methods and are developing a suitable procedure of operation. Plans were initiated to conduct a limited round-robin test to determine substitution values for the Gehman, Clash Berg, and the bending beam method of ZZ-R-601. These values could then be incorporated in specification test changeovers to the use of the Gehman test agreed upon at the last meeting.

Low-Temperature Elastic Recovery

The compression set test is already in widespread use for the measurement of low-temperature elastic recovery. Little discussion took place at this meeting on either the temperature-retraction or the tension recovery procedure except to point out the rather severe stresses to which the rubber is subjected. In many cases these stresses are out of proportion to the stresses the rubber would undergo in actual service. The study and evaluation of both methods will be continued in the various Armed Forces laboratories.

Summary

The instruments and methods agreed upon at the First Armed Forces Low-Temperature Testing Symposium are being incorporated in Federal Specification ZZ-R-601.

The symposium closed with a round-table discussion relative to variations in testing procedures and conditions that the several Armed Forces laboratories employ when conducting low-temperature tests.

The various temperatures at which specification tests are run were discussed. It developed that those temperatures which are at variance with those usually used by all are needed for some special end-item requirement by a particular branch of service.

The test media used to condition the samples were also found to vary among the various laboratories. One laboratory presented data showing that a one-hour conditioning period in air gives the same results as when the samples are conditioned three minutes in a liquid medium. This positive correlation was found in both Admiralty indentometer hardness measurements and in brittle point determinations made using a Scott solenoid tester. Another laboratory reported its experience using liquid media for conditioning baths. The bath, in this case methanol, showed little, if any, deteterious effect upon the samples undergoing compression set tests.

The importance of the accuracy of the temperature indicating devices used was also pointed out. The laboratories use various types of thermometers or thermocouples in determining temperatures which are subsequently reported in round-robin studies and used for correlation purposes. In the past this practice has been a repeated source of error in correlation studies. It was felt more attention should be given to standardizing these devices as well.

It was agreed to poll those Armed Forces laboratories represented regarding their recommendations as to test temperatures required or desired, test media for conditioning the samples, and periods of conditioning. With the results of this poll in hand it is hoped to be able to standardize the testing procedures and conditions, as well as the specification test apparatus, for use in Armed Forces procurement specifications.

[1] Prepared by John R. Britt, materials engineer, Department of the Navy, Bureau of Ships, Research & Development Division, Elastomer Branch, Code 344, Washington 25, D. C.

Trainer Discusses Industry Prospects

A TALK on "Prospects for the Rubber Industry" by J. E. Trainer, vice president of Firestone Tire & Rubber Co., highlighted the Akron Rubber Group spring meeting, held on March 7 at the Mayflower Hotel, Akron, O., with some 550 members and guests attending.

Industry has merely scratched the surface of rubber usage in many fields despite all the inroads of plastics, Mr. Trainer said. He emphasized the tremendous potentials for new uses of rubber and pointed out the great requirements for rubber in such fields as latex foam, paints, and paving compounds. The vast growth in the number of automobiles was also cited as a major factor in the continuing expansion of rubber usage.

The speaker admitted that plastics have replaced rubber in many fields and have made an impressive advance in the last 10 years, but said that we should look upon these developments as opportunities for expanding the rubber business and not as threats to the industry. Since the similarity between rubber and plastics extends to materials, production techniques, and equipment, the plastics field offers added reason for optimism regarding the future of the rubber industry.

Keener competition in improving existing rubbers can be expected when the government synthetic rubber plants are transferred to private industry, Mr. Trainer declared. Among the improvements we can expect to see will be synthetics that will run cooler in large tires; synthetics that will give longer tread life; and synthetic latices with improved physical properties.

Visitors at the meeting included an 11-man group from the Japanese rubber industry representing the Synthetic Rubber Manufacturing Project Committee of Tokyo. These men, making a two months' study of American synthetic rubber production, were guests of the Group at the meeting.

New officers of the Group, to assume their duties on September 1, were announced as follows: chairman, Roy H. Marston, Binney & Smith Co.; vice chairman, V. L. Petersen, Goodyear Tire & Rubber Co.; secretary, Fred W. Gage, Columbia-Southern Chemical Corp.; and treasurer, H. M. Brubaker, Witco Chemical Co.

Membership Chairman L. A. Anderson, Leverett A. Anderson Co., announced that the Group now has reached a new record total of 1,557 members. Charles Stalker, General Tire & Rubber Co. and general chairman of the forthcoming summer outing, announced the selection of the following sub-committee chairmen for the outing: prizes, V. K. Hitch, Akron Chemical Co.; golf, Dan Dougherty, Herron Bros. & Meyer, Inc.; entertainment, M. Bobbitt, Firestone; and food and location, L. V. Cooper, Firestone. The drawings for door prizes were won by R. A. Emmett, Binney & Smith, and David Neill, Farrell-Birmingham Co.

Dinsmore Discusses New Goodyear Rubber

A TALK on "The New Goodyear Rubber" by R. P. Dinsmore, Goodyear Tire & Rubber Co., highlighted the March 18 meeting of the Washington Rubber Group, held in the Pepco Auditorium, Washington, D. C. The meeting was preceded by an informal dinner by friends of the speaker, at the Touchdown Club.

The new Goodyear rubber, designated Chemigum SL, is chemically similar to the Vulcollan rubber developed in Germany, Dr. Dinsmore stated. While Vulcollan is molded by casting procedures which limit its usage, Chemigum SL can be processed on conventional rubber equipment which makes possible a wide range of applications. Unlike most rubbers, with the exception of the Thiokols, Chemigum SL is the result of a condensation polymerization. The first step consists of the formation of a polyester through the condensation of difunctional acids and alcohols such as adipic acid and ethylene glycol, and the elimination of water. The polyester is further reacted with diisocyanates to extend the chain length. Water is then added to react with the isocyanates at the chain extremities to form ureas having reactive hydrogens capable of further reaction with the diisocyanates to provide the desired cross-linking.

By the use of proper control methods and the addition of amines, Goodyear makes a raw gum having a storage life of 6-12 months. These procedures also eliminate blistering tendencies and develop better properties in the finished vulcanizates. At 77° F. the molded rubber has a tensile strength of 5,450 psi., ultimate elongation of 750%, high rebound, Shore A hardness of 65, freezing point of —38° F., and excellent resistance to ozone and ultra-violet light. Other properties of interest are high abrasion and tear resistance, and minimum swell in SR-6 and SR-10 test fluids. Electrical properties are said to be equivalent to those of natural rubber.

At 200° F., the tensile properties of Chemigum SL drop to 2,860 psi., while elongation increases to 845%. Exposure to dry aging at 212° F. results in a slight decrease in tensile strength that is considerably less than that shown by natural rubber gum or tread stocks under the same conditions. The tensile strength of Chemigum SL drops to 4,700 psi. after 30 days at 158° F., and to 500 psi. after 14 days at 250° F. Under wet conditions at elevated temperatures, particularly above 100° F., some hydrolysis is experienced, with a resultant decrease in strength properties. Very little change in strength has been found to occur in water at 77° F., the speaker declared. Strong acids and alkalies exert a determining effect on the finished rubber.

While the raw gum has no inherent building tack, some improvement in this respect can be obtained by proper use of methyl ethyl ketone, Dr. Dinsmore said. Adhesion to other rubbers can be obtained through the use of tie stocks consisting of mixtures of the two rubbers involved. Major compounding of Chemigum SL can be carried out in a Banbury, followed by processing on cool rolls. Carbon blacks do very little to enhance the strength properties of the rubber; in fact, concentrations over 10-15 parts cause a decline in desirable properties. Ordinary plasticizers act as diluents in the rubber.

In concluding the talk, Dr. Dinsmore displayed samples of different products in which the properties of Chemigum SL have been used to advantage. These products included shoe soles found superior to standard rubber soles in a 350-mile wear test; Chemigum SL veneers on tires made with standard rubber carcasses; solid tires; sandblast hose liners; cargo plane flooring; oil seal rings; liners for oil-resistant pressure hose; and decorative coatings and veneers on rubber in luggage stocks.

In the business session preceding the talk, it was announced that the Group now has 308 paid members, of whom 34 were added during the past year. President Norman A. Bekkedahl, National Bureau of Standards, announced the appointment of the following committee chairmen: budget, Paul S. Greer, Synthetic Rubber Division, RFC; nominating, Harold E. Wirth, Firestone Tire & Rubber Co.; and outing, W. J. Sears, The Rubber Manufacturers Association, Inc.

Howland Talks on LTP

Two speakers from the United States Rubber Co. were featured at the April 15 meeting of the Washington Rubber Group, also held in the Pepco Auditorium. The first speaker, Louis H. Howland, discussed "Some Recent Developments in Polymerization of GR-S at Low Temperatures," and the concluding talk on "Expanded Vinyl Plastics" was given by Martin J. Kleinfield, of the company's Naugatuck Chemical Division.

Dr. Howland reviewed the development of formulae for polymerization of GR-S at 41° F. First efforts at polymerization required about 14 hours to reach 60% conversion. It was found that the addition of 0.003-part of diethylene triamine per 100 parts of charge reduced the polymerization time to eight hours, and a further reduction was achieved by the addition of potassium sulfite in small quantities. Work on subfreezing polymerization has shown that use of methanol has a deleterious effect on polymer quality, and that fatty acid is more effective than rosin soap activation. Other methods of reducing conversion time were also discussed, including the use of plate-type heat exchangers, and continuous polymerization in tubular-type reactors. This latter method is still in the pilot-plant stage, Dr. Howland said, but shows promise of speeding up production and reducing installation costs.

The talk on expanded vinyls by Mr. Kleinfield was similar to that which he gave before the February 17 meeting of the Elastomer & Plastics Group, Northeastern Section, A. C. S., and reported in our April issue, page 70.

Adhesion Fundamentals

SOME 77 members and guests of the Elastomer & Plastics Group, Northeastern Section, A. C. S., attended the March 17 meeting, held at Massachusetts Institute of Technology, and heard Herman P. Meissner, of the Institute, speak on "Some Aspects of Adhesion."

Dr. Meissner first outlined one of the objectives of adhesives research, the development of techniques, and described some of the methods used to determine total free energy, heat of wetting, and surface tension. Harkin's theory of the work of cohesion was discussed, and it was pointed out that breaking strength could not serve as a precise indication of cohesive value. The speaker emphasized the great influence of flaws in the material upon the strength values obtained in tests and estimated that values 100% greater than those presently measured could be obtained with some materials if flaws were eliminated.

In discussing the calculation of the theoretical work of adhesion, Dr. Meissner showed that this work could not be determined accurately from breaking data. Similarly, it was shown that the total surface energy of a system and the heat of wetting were not precise values for predicting adhesive strengths of materials. While noting that there is no criterion at present for accurately predicting the adhesive values of bonded materials, Dr. Meissner expressed the hope that such tests will be developed in the future.

Rubber, Resins Symposia

The April 9 meeting of the Group served as the 428th meeting of the Northeastern Section and was also held at Massachusetts Institute of Technology. The meeting program consisted of an afternoon symposium on "Rubber-Plasticized Resins," a cocktail hour, dinner, and an evening symposium on "Synthetic *versus* Natural Rubber, 1960."

Some 175 members and guests were present at the afternoon session, which was presided over by Henry A. Hill, National Polychemicals, Inc., who introduced the two speakers: A. P. Landall, General Electric Co., "Rubberized Phenolics," and J. F. Malone, B. F. Goodrich Chemical Co., "Rubberized Vinyls."

Mr. Landall stated that the development of rubber-phenolics at G-E grew out of a need of these materials in problems within the company. After discussing the growth and development of the rubber-resins, the speaker described the properties of the materials and the tests used for evaluation. It was emphasized that the 15-25% content of elastomer used in the materials is essential in their use for the manufacture of firm, dimensionally stable, low shrinkage, non-thermoplastic products. The importance of proper mold design in reducing shrinkage and warpage and in obtaining a smooth surface finish in molded parts was also discussed.

Mr. Malone said that nitrile rubbers are the only elastomers used in any quantity for plasticizing vinyls, and products of this type are exemplified by plasticized Geon polyvinyl chloride. The elastomer can be either mill mixed into the plastic or combined in the latex stage, with subsequent coagulation and drying. This latter method of preparation is exemplified by the Geon polyblends. Comparisons of polyblends with mill mixes were made by means of slides to show the softer nature and lower modulus of the polyblend, and the effect of plasticizer content on tensile and elongation of products made by the two methods. The importance of fluxing polyblends at a temperature of over 300° F. was stressed, and the stability of these modified materials before blending was shown by the lack of dimensional changes after 15 minutes at 325° F. The blends extrude 50% faster than mill mixed resins and have much less nerve.

When compared with liquid plasticized resins, polyblends act like rubber in that they can be cold compounded on a mill, and have greater plasticity at processing temperatures, Mr. Malone said. In addition, vulcanizing or curing the polyblends gives better compression set and abrasion resistance, and higher tensiles that can be

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obtained with mill mixed stocks. Lubricants, heat stablizers, colors, and other compounding ingredients for the rubber-vinyls were discussed by the speaker. While thiazoles are satisfactory accelerators for the rubber-resins, other accelerators may cause resin breakdown. Zinc oxide can be used to activate the nitrile rubber component if enough vinyl stabilizer is used.

About 120 members and guests attended the dinner and the evening symposium which followed. L. H. Perry, Union Bay State Chemical Co., presided over this session and introduced the two speakers: Warren S. Lockwood, Natural Rubber Bureau, "The Future of Natural Rubber," and Sidney M. Cadwell, United States Rubber Co., "The Future of Synthetic Rubber."

Mr. Lockwood stated that Malaya is in danger of losing on the economic front what it is winning on the military front. A price of 25¢ per pound for Malayan crude rubber is the absolute minimum that could support the economy of the area, and the current government price for GR-S of 23¢ per pound means crisis in Malaya. The speaker asserted that the present GR-S price is too low to meet production costs here, and its maintenance until the GR-S plants are taken over by private industry would be ruinous for the Malayan economy.

The appointment of a special committee by the government to study the effects of GR-S pricing on international policy was recommended by Mr. Lockwood. This committee should survey all sources of cost that will govern GR-S price, when the plants are privately operated, and recommend a fair price for American industry. Expressing the belief that natural rubber will level off near synthetic rubber in price, the speaker said that this action by the government would be a goodwill gesture to the Far East and provide a sound base for efficient operation of the GR-S plants.

Dr. Cadwell reviewed the growth and development of synthetic rubber, noting that one way to judge its future is to consider past performance. After discussing cold rubber, oil-extended GR-S, rubber-plastic blends, and other recent developments, the speaker emphasized that the synthetic rubber industry is more than a "war baby" to be put away in mothballs during peacetime.

"From the standpoint of new product possibilities, the synthetic rubbers have made a major contribution to our industry," he declared.

Reference was also made to cold GR-S, oil-extended GR-S, and rosin extended cold GR-S which, in laboratory tests, has proved to be 25 to 50% better in wear than standard cold GR-S.

High Impact Molding Compounds by Synvar

SYNVAR CORP., Wilmington, Del., has entered the field of high impact phenolic molding compounds with the marketing of three new compounds having impact strengths of 0.6-1.0, 1.0-2.0, and 2.0-3.0 foot-pounds per inch of notch, respectively. These new products, manufactured in natural and black colors, are said to have good molding, cure, surface, electrical, and storage properties. They are expected to supplement Synvar's present line of general-purpose, heat resistant, and improved impact phenolic molding compounds.

Synthetic Rubber Situation

A TALK by Henry F. Palmer, vice president of Kentucky Synthetic Rubber Corp., on "The Synthetic Rubber Situation" featured the April 2 dinner-meeting of the Fort Wayne Rubber & Plastics Group. The meeting took place at the Van Orman Hotel, Fort Wayne, Ind., and was attended by 113 members and guests.

After reviewing the government synthetic rubber program from its inception to the present, Dr. Palmer pointed out that world requirements for rubber during the next 10-20 years are expected to exceed greatly the supply of both natural and synthetic rubbers. It will probably be necessary to construct a considerable amount of new synthetic rubber producing capacity, the speaker declared. Under present monetary conditions, synthetic rubber can probably be sold at not less than 25¢ a pound, and from 3-7¢ cheaper for oil-extended types. While it is not possible to predict what the future price of natural rubber will be, there is every reason to expect that natural and synthetic rubber will be reasonably competitive both quality-wise and price-wise, and that each will have its place in the economic system, Dr. Palmer said.

The speaker stated that the recently publicized pipeline polymerization technique shows definite possibilities, but requires further development before it can be used commercially. Private industry has a good record in research and development, and it should be allowed to take over these functions in synthetic rubber within a year after disposal of the government plants. In discussing proposals for plant disposal, Dr. Palmer stated that government thinking appears to be directed toward a higher return on the original investment than during disposal of some facilities in the postwar period. A reasonable attitude by both government and private industry is needed in negotiating prices under the plant disposal program. The speaker noted that a particularly good opportunity is available for industry to purchase collectively the government laboratories in Akron as the nucleus for the often-mentioned rubber institute.

In addition to the talk the technical session included showings of films on the mining and processing of zinc and zinc oxides. These films were made available by St. Joseph Lead Co.

New officers and executive committee members of the Group were announced as follows: chairman, Charles Cougill, Auburn Rubber Co.; vice chairman, Howard Rapp, Belden Mfg. Co.; secretary-treasurer, John Carlson, Paranite Division, Essex Wire & Cable Corp.; and executive committee, A. R. Brandt, Schacht Rubber Co., J. Dunne, C. P. Hall Co., C. N. Everingham, Goshen Rubber Co., P. Lantz, Syracuse Rubber Co., M. O'Connor, O'Connor & Choate, Inc., and W. Wilson, R. T. Vanderbilt Co., Inc. In the business meeting it was voted to change the Group's by-laws to permit the past chairman to be a member of the executive committee.

Resin-Rubber Blends

THE March 20 meeting of the Boston Rubber Group inaugurated the Group's new program of having afternoon technical sessions at its spring and fall meetings. Approximately 180 members and guests attended the afternoon session at the Somerset Hotel, Boston, Mass. Highlight of the meeting was a talk on "Resin-Rubber Blends" by Paul M. Elliott, Naugatuck Chemical Division, United States Rubber Co.

Dr. Elliott first reviewed the history and development of plastic and resin-rubber materials. Early attempts to make a product that would have the toughness and the low brittle point of the rubbers together with the high heat distortion and impact resistance of the plastics, led to the development of Royalite, Styron, Lustrex, QMS, and the Kralastic and Boltaron of today. Each year in the developmental history of resin-rubber blends brought improvements in the properties desired as refinements in production and materials were discovered.

Using numerous slides, the speaker outlined the characteristics of these resin blends and the tests used to evaluate the materials. He concluded with a discussion of molding and extrusion of resin-rubber blends, displays of typical product applications, and comparisons of these blends with vinyl copolymers and saran.

Following a cocktail hour, a dinner was held with 343 members and guests attending, at which Group Chairman Alan W. Bryant, Binney & Smith Co., presided. Harry W. Sutton, of Boston Woven Hose & Rubber Co. and chairman of the local arrangement committee for the Rubber Division meeting in Boston in May, outlined plans for this affair and thanked the many members who are serving on the arrangement committee. The after-dinner speaker was John Nichol Mark, pastor of the Congregational Church in Arlington, Mass., who gave an interesting and witty talk on what is right with America.

RABRM Rubber Literature Circular Available

THE Intelligence Division of the Research Association of British Rubber Manufacturers, 105-7 Lansdowne Rd., Croydon, England, has asked us to announce the availability of its Information Bureau Circular No. 410, "Systematic Classification of Scientific, Technological, and Commercial Information on Rubber," which is now the agreed system used by the RABRM, Rubber-Stichting in Delft, Holland, the Institut Française du Caoutchouc in Paris, France, and all the associated institutions of the RABRM in Europe and the Far East. The system is the basis of classification used in the monthly periodical of the RABRM known as "Rubber Abstracts," now in its thirty-first year.

It is proposed eventually to issue the system in printed form, and also in French and German versions, together with an index, now in preparation, and the RABRM is soliciting comments and suggestions from interested librarians and rubber technologists for consideration before the system is put in print.

The original version of the code was devised by the late T. R. Dawson for use of the Library and Intelligence Division of the RABRM. The code is still in the form of the Dawson system, although Section 1 on Planting has been rewritten according to the French pattern, and in 3S there has been a change in the method of dealing with copolymers. New major classes are 2S Synthetic Latex, 3N Reclaim, and 3SN Synthetic Rubber Reclaim.

The Circular can be obtained free of charge on application to the Secretary of the RABRM at the above address of the Association.

Shipboard Rubber Uses

A TALK on "Shipboard Rubber Applications" by Theodore A. Werkenthin, Bureau of Ships, Navy Department, featured the March 27 dinner-meeting of the Chicago Rubber Group. Held at the Furniture Mart, the meeting attracted an attendance of approximately 180 members and guests. A cocktail hour preceded the dinner, with oysters furnished through the courtesy of O'Conner & Choate, Inc. In addition to the featured speaker, Lt. Col. Howard T. Markey spoke on "An Airman's View of Korea," and a brief account of the activities of the Division of Rubber Chemstry, A. C. S., was given by Division Chairman S. G. Byam, E. I. du Pont de Nemours & Co., Inc. The program also included a drawing for door prizes, won by R. C. Banta, Brown Rubber Co., and G. H. Glade, Jr., Glade Mfg. Co.

Mr. Werkenthin first reviewed the quantity of rubber used in naval vessels, noting that an aircraft carrier of the *Midway* class requires about 75,000 pounds of rubber; battleships like the *Missouri* use about 55,000 pounds; submarines require about 48,000 pounds; destroyers average about 4,500 pounds; and smaller vessels use from 500-3,000 pounds of rubber. While not very large in terms of the total ship tonnages, the importance of most rubber items used by naval vessels is out of all proportion to the weight involved.

The speaker then dealt with the different types of rubber applications in the Navy, including the types of rubber used, methods of application, and problems involved. These applications cover the fields of protective coverings, underwater coatings, deck coatings, decking and matting, tank coatings, calking compounds, submarine battery compartment linings, shaft coverings, water lubricated strip bearings, shock and vibration mountings, expansion joints, door and hatch gaskets, hose, life-saving equipment, and such special applications as electronic parts, rubber springs, rubber clutches and brakes, and protective clothing and equipment.

Mr. Werkenthin illustrated his talk with photographs of unusual rubber applications and also distributed copies of a list of shipboard rubber applications showing the specifications under which the parts are purchased. There was also a showing of a sound film depicting a typical day in the life of a Navy inspector.

Hycar Changes

THE B. F. Goodrich Chemical Co., Cleveland, O., has revised the coding system for Hycar rubbers. The OR designation has been retired in favor of a four-digit numbering system which indicates the polymeric form (first two digits), the manufacturing procedure used to produce it (third digit), and the acrylonitrile content (fourth digit). The change was necessitated by the development of specialized polymers whose differences could not be readily ascertained from the previous code numbers.

A second change in the Hycar picture has been the introduction of Hycars 1042 and 1043. These nitrile rubbers are low-temperature polymerized versions of Hycars 1012 and 1013, respectively. General acceptance of these low-temperature materials has decided the company to discontinue the production of 1012 and 1013 after January 1, 1954.

In addition to the above polymers, the current list of Hycar nitrile rubbers is as follows: 1001, 1011, and 1411 representing regular, easy processing, and powdered high acrylonitrile copolymers, respectively; 1002, 1022, and 1042 representing regular, non-staining and soluble, and easy-processing cold polymerized medium high acrylonitrile copolymer, respectively; 1043, an easy-processing cold polymerized medium acrylonitrile copolymer; and 1014, an easy-processing low acrylonitrile copolymer. The Hycar butadiene-styrene copolymer is designated by 2001, and the Hycar polyacrylic rubber is 4021.

Conidendrols Tested as Stabilizers

ALPHA- and beta-conidendrol, two new polyphenolic compounds derived from conidendrin, a substance occurring in many coniferous woods, have been compared with accepted stabilizers in a variety of products by chemists of the Southern Regional Research Laboratory, Bureau of Agricultural & Industrial Chemistry, United States Department of Agriculture. The conidendrols were tested as stabilizers of synthetic rubber against aging and hardening, as inhibitors of polymerization of certain vinyl-type monomers, and as inhibitors of oxidation in vegetable oils, lard, and fat-containing candies. The conidendrols are said to have performed as well as or better than a number of accepted stabilizers.

Toxicity studies now under way must be completed before the conidendrols can be considered for use in stabilizing food products. Work by the Laboratory chemists on the conidendrols has been reported in three articles in the *Journal of the American Oil Chemists' Society*. Free reprints of these articles may be obtained by writing the Southern Regional Research Laboratory, 2100 Robert E. Lee Blvd., New Orleans 19, La.

High Polymer Forum Planned

THE Fifth Canadian High Polymer Forum sponsored by the Chemical Institute of Canada and the National Research Council will be held in London, Ont., November 19-20. Offers of contributions to the program are invited and should be addressed, accompanied with a 200-word abstract, to Dr. R. V. V. Nicholls, Department of Chemistry, McGill University, Montreal, P.Q., Canada.

Du Pont Research

THE Northern California Rubber Group held its monthly meeting on April 9 at the Berkeley Elks' Club, Berkeley, Calif., with 64 members and guests attending. A cocktail hour preceded the dinner, following which Walter A. Dew, E. I. du Pont de Nemours & Co., spoke on his company's program of research.

Dr. Dew informed his audience that du Pont is currently spending $1,000,000 a week on research and development. The tangible return from research can be readily appreciated, he stated, by realizing that one-half the company's present products were not manufactured in 1930. Chlorinated hydrocarbons, rubber-base paints, Teflon, neoprene, Hypalon, Orlon, and nylon were cited in this respect as products directly resulting from research. Besides this activity du Pont is supporting fellowships in chemistry training in colleges and universities to the amount of $600,000.

In the business session conducted prior to the address, it was voted to hold the Group's summer picnic at Adobe Creek Lodge in Los Altos on September 19.

Rhode Island Club Meets

A TOTAL of 178 members and guests attended the April 16 dinner-meeting of the Rhode Island Rubber Club, making it the largest spring meeting in the history of the organization. Held at the Metacomet Golf Club, East Providence, R. I., the meeting featured a talk by A. J. Marchessault, Federal Bureau of Investigation, on "The Work of the FBI." C. R. Haynes, Binney & Smith Co. and secretary of the Division of Rubber Chemistry, A. C. S., also spoke briefly on the forthcoming Division meeting in Boston.

French Study Quality Control

A forum on the background of statistical quality control in current industrial practices was held recently at the Park Sheraton Hotel, New York, N. Y., for members of a French Quality Control Study Group. The meeting was sponsored by the Mutual Security Agency in collaboration with the Metropolitan Section of the American Society of Quality Control. The foreign group is devoting six weeks in this country to the study of methods for effectively controlling the quality of manufactured goods through the use of statistical quality control techniques.

The proceedings were moderated by A. B. Mundel, Sonotone Corp., and were attended by representatives of ten organizations, including Anaconda Wire & Cable Co., Bell Telephone Laboratories, Inc., Johns-Manville Corp., Western Electric Co., and American Standards Association.

New Harwick Products

Harwick Standard Chemical Co., Akron, O., has announced the addition of monoethanolamine, diethanolamine, and triethanolamine to its line of chemicals. The company states that all three materials can be used as intermediates in the manufacture of various surface active agents and rubber chemicals. Monoethanolamine and diethanolamine are also suggested for use as gas scrubbing agents in refinery operations; while the mono compound is further suggested as an agent in the manufacture of antibiotics.

James E. Burke, for several years Proctor & Gamble brand manager for Drene Shampoo, has been appointed a product director for Johnson & Johnson, New Brunswick, N. J. Mr. Burke will work specifically with the company's conventional Band Aid adhesive bandages, First Aid Kits, and Cohesive Gauze.

NEWS of the MONTH

The Senate Banking & Currency subcommittee on rubber, the House Armed Services subcommittee on rubber, and an Administration agency group are reported to be following the recommendation in the President's message of April 14 and to be working more or less jointly on a bill for synthetic rubber plant disposal. Hearings probably will be held in late May and early June, and legislation may pass the House about June 1. If there is any difficulty in moving the legislation through Congress, it will probably be over the issue of national security considerations, but passage of the legislation before Congress adjourns seems quite possible.

April saw increased efforts from various sources to change the price for which the government sells its synthetic rubber. A report that Administration leaders, lead by Treasury Secretary George H. Humphrey, were considering a recommendation to increase the price of synthetic rubber in order to realize additional earnings from the synthetic rubber plants, before they are sold to private industry next year, resulted in the Rubber Manufacturers Association stating on April 23, it had received denials from "high and completely responsible sources close to the Administration."

Leaders of America's rubber industry left for the International Rubber Study Group meeting in Copenhagen, Denmark, in May, primed with arguments against the natural rubber "buffer stock" proposal up for review.

A new record in total new rubber consumption was established in March when 128,237 long tons of new rubber were used. Both natural and synthetic rubber consumption increased between 12 and 13% in that month.

The Federal Trade Commission's quantity limit rule on tire replacement sales, now in abeyance pending a decision from the Appellate Court, should be decided in May.

Several industry leaders, prior to their departure for Europe and the Rubber Study Group meeting, made separate statements condemning the "buffer stock" plan and endorsing President Eisenhower's recommendation to Congress that synthetic plant disposal legislation be enacted promptly.

Washington Report by Arthur J. Kraft

Synthetic Plant Disposal Bills Being Written; Passage of Legislation by June 1 Possible

Developments looking toward disposal of the government's synthetic rubber plants to private industry moved along at a steady pace following President Eisenhower's strong endorsement of immediate sale of the plants in a message to Congress on April 14.

Here is how the situation stood in late April:

An administrative agency group, working with Reconstruction Finance Corp.'s disposal chief, Morton Yohalem, was completing the draft of a disposal bill, following the disposal program recommended in the RFC report of March 1, which had been endorsed by the President and Congressional leaders.

At the same time, Chairman Capehart and Senator Bricker of the Senate Banking & Currency Committee had instructed the committee staff to draft a bill, also modeled on the Eisenhower message and the RFC report. In late April the Administration drafting group and two of the Congressional committees with jurisdiction over disposal (Senate Banking and House Armed Services) were expected to be meshing their efforts.

The Senate Armed Services Committee, which shares Senate jurisdiction on disposal with the Banking Committee, had taken no action. A leading minority member, Sen. Lyndon Johnson, of Texas, however, had written to RFC in early April urging that disposal be conditioned on adequate safeguards to assure continued production of synthetic rubber at all times and that all plants sold be maintained by private industry to produce synthetic rubber should an emergency arise. RFC had recommended a "national security clause" for disposal contracts to assure that full-scale synthetic production would be available if needed, and such a provision was expected to be part of the Administration disposal bill.

While something still remained desired by way of complete coordination between the executive agencies and Congress on drafting disposal legislation, it was apparent that all interested parties were aiming at the same thing: passage of disposal legislation before Congress adjourns this summer. As it now stands, hearings probably will be held in late May and early June. Rep. Paul Shafer, whose subcommittee has gathered valuable time-saving data on inspection trips during February and April to rubber plants in Akron, O., Baton Rouge, La., and Houston, Tex., was planning on opening hearings immediately after his return from Copenhagen, about May 22. He plans "thorough hearings" taking about four days and expects legislation to pass the House about June 1. Senator Capehart may order Banking Committee hearings prior to that time, but more likely will wait until rubber industry and government executives return from the International Rubber Study Group meeting in Copenhagen, which opens May 11.

By way of review, the Capehart-Bush bill to delay until July 15 the deadline for the President's message on disposal to Congress, introduced in the Senate in late March[1] never got out of the House Armed Services subcommittee on rubber; so the President's message was delivered on April 15, as originally scheduled. The Capehart-Bush bill was introduced at the request of Secretary of the Treasury Humphrey, who, with the Commerce Department, was assigned the task of reviewing RFC operations in the light of the Administration's announcement that RFC will be allowed to expire in April, 1954. The Treasury Department had no intention of delaying disposal legislation and failed to realize that the 90-day extension would threaten delay. The primary reason for the House Armed Services subcommittee on rubber refusing to go along with the move was that it felt that the delegates to the International Rubber Study Group meeting should have the benefit of the President's views before the meeting began May 11.

President Eisenhower, in his message recommending disposal, left the drafting of the disposal legislation up to the "joint efforts" of executive agencies and the Congressional committees having jurisdiction over disposal. This mandate apparently will be followed. The President said that "disposal of the government-owned facilities must be consistent with three objectives: In the first place, the government should realize their full fair value. Secondly, disposal should be effected in such a way as to insure to the consuming public, and to large and small rubber fabricators, the benefits of fair competition. Finally, to insure against the hazards of unforeseeable contingencies, the facilities must be sold on such terms as will guarantee their ready availability for the production of synthetic rubber in time of emergency."

The first condition follows the RFC recommendation that the plants be sold at the highest prices "consonant with the attainment of a competitive" privately owned synthetic rubber industry. The second calls attention to the need of assuring adequate supplies to small users, who are worried they will not be served if shortages should arise after the plants are sold. The third makes a "national security clause" a must, which should help meet the wishes of Senator Johnson, the House Armed Services Committee's ranking Democrat, C. Vinson, and others concerned chiefly with national security aspects of synthetic rubber.

Shafer, who expects disposal legislation to have a relatively smooth ride through Congress, highlighted the unanimity of view on disposal demonstrated by the Administration in the Eisenhower message and the RFC report, in a statement issued on April 20. The President's message, he said, concurred with the views expressed by Mr. Shafer in a House speech on February 18, and with the RFC report. He added that his own views as to the probability that a private, competitive synthetic rubber industry will best serve the security interests of this country have been "immensely strengthened" by what he saw and heard while touring the synthetic rubber plants.

"We found that a competitive pattern is developing which augurs well for a vigorous, healthy, and forward-looking synthetic rubber industry under private ownership and operation," he said. "In terms of the immediate problem of disposal, this seems to assure that the government will

[1] See India RUBBER WORLD, Apr., 1953, p. 88.

receive a fair and adequate price for the facilities—probably in the neighborhood of the $300 million figure which I had previously cited as reasonable. Even more important, and in terms of the long-time picture, I believe this competitive pattern will serve to keep down the price of synthetic rubber and synthetic rubber products, and will also stimulate constant experimentation and technological improvement of both product and production methods."

Shafer, back in February, had suggested that the government realize "at least $350 million" for the plants, but he was then speaking of all 28 facilities, including two alcohol-butadiene plants. Later he expressed the opinion that the alcohol plants would not find buyers, and his new $300-million price-tag is intended to exclude these two facilities, he explained in an interview.

Shafer said he is convinced that the synthetic rubber industry under private ownership "can be depended on for an all-out response to emergency needs as much as any other private industry." No recapture (seizure) clause "is needed in the disposal legislation or sales contracts," he added. He did not state his views on the desirability of the suggested "national security clause" which requires only that private operators keep their plants in readiness to produce synthetic rubber on short notice in a national emergency.

It is still too early to tell whether disposal legislation will have an easy time moving through Congress. If there is a fight, it will probably be over the issue of national security considerations, on which Johnson and Vinson, both widely respected by their colleagues on questions involving the nation's industrial and military strength, hold strong views. They both can be expected to insist that sale of this government industry not imperil the national safety.

If they do not get what they regard as adequate safeguards, a battle may be expected when disposal legislation comes up for vote. If a battle comes, the legislation probably will pass, possibly with the vote split on straight party lines.

Synthetic Rubber Price To Remain Unchanged

Despite rumors regarding the raising or lowering of the price of GR-S and possibly butyl rubber, it appeared in late April that the presently existing prices would remain unchanged. On April 9, RFC again repeated that it contemplated no change "either up or down" in the price at which it sells GR-S. The statement was made to quiet trade rumors that the 23¢-a-pound price would be lowered to meet the decline in prices of natural rubber which occurred early in April, as the Soviet Union opened its "peace offensive."

Also in April, RFC submitted to the Budget Bureau a revised budget for its synthetic rubber operations for fiscal 1954, the year beginning this July 1. In it the agency said it planned to continue running its alcohol-butadiene plants at present levels through fiscal 1954, with the aim in mind of building its GR-S inventory to 122,000 long tons by June 30, 1954—the end of that fiscal period. The Budget Bureau questioned the desirability of tieing up heavy funds in an inventory of higher cost rubber, when the synthetic rubber industry probably will be sold some time in 1954. To RFC's argument that the inventory may be needed to meet temporary shortages following disposal, and that it could be produced at about 23¢ a pound—its break-even point—Budget answered that there also was a possibility it could not be all sold and might have to be dumped at lower prices, meaning an operating loss.

The Budget Bureau suggested that RFC hold down its inventories to about 52,000 tons, the level RFC anticipated last fall it would reach on June 30, 1953. RFC no longer expects to reach that level by June 30, because of the current peak demand for all the rubber it can produce. Present GR-S inventories are about 25,000 tons. It figures on a stock of some 30,000 or 35,000 tons by June 30. RFC justifies the economics of building a large inventory by running its alcohol plants through June, 1954, with figures stating that it can produce 650,000 tons a year of petroleum-based GR-S, sell it at 23¢ a pound, and make a profit of $50 million. It could produce 100,000 tons of alcohol-based GR-S, sell it at 23¢ a pound, and still emerge with an overall profit of $50 million on total sales of 750,000 tons. Costs of producing the alcohol-based rubber would not exceed a 23¢ selling price, RFC contended, because of the availability of alcohol at low prices from commercial sources.

It was then reported that the Treasury Department thought RFC was losing money on the alcohol-based GR-S it made last year, which cost about 32¢ a pound, but was sold for 23¢ (an average of high-cost alcohol rubber and low-cost petroleum rubber). Treasury had noted that the 23¢ price was not reduced when RFC closed down its alcohol-butadiene plants last fall and was producing all its GR-S for a cost of less than 20¢ a pound and selling it for 23¢. In the view of the Treasury Department, RFC could justify obtaining the same profit margin it enjoyed during the above-mentioned period and could add more than $50 million to the government's income at a period when every means of balancing the national budget was being considered. In addition, a demonstration of the greater earning capacity of the synthetic rubber plants might make their sale to private industry easier.

If higher prices resulted in decreased consumption of GR-S, the lower demand could be accommodated by closing down the alcohol-butadiene plants. Such action would also meet the objections of the Budget Bureau to tieing up a lot of capital in a big GR-S inventory.

RMA on April 23, however, stated that denials of the report that the government is considering any increase in the price of synthetic rubber had come to it on that day from high and completely responsible sources close to the Administration.

"We have been informed that there is no basis in fact for the claim made in a New York paper today that 'Administration leaders are giving serious thought to boosting the price of synthetic rubber' and that 'supporters of the idea, led by Treasury Secretary George M. Humphrey, think the government should seize its chance of realizing additional earnings from its synthetic rubber plants, before they are sold to private industry late next year,'" W. J. Sears, vice president of the RMA, said.

"We have been advised that neither Secretary Humphrey, who is in Paris, nor any of the responsible officials of the department have in any manner considered any proposal regarding a change in the synthetic price structure.

"We have also learned that neither the Administration nor any department has approached the Reconstruction Finance Corp. with any proposals regarding a change in synthetic rubber price. Under the law, price policy regarding synthetic rubber is completely and exclusively an RFC responsibility.

"The RFC announced within the past few weeks that it does not contemplate any change in GR-S price, either up or down. We are informed that there is no change in this policy," Sears concluded.

Copenhagen Study Group Meeting and the "Buffer Stock" Plan

Leaders of America's rubber manufacturing industry will be primed with arguments against the natural rubber "buffer stock" proposal which will be up for review at the annual meeting of the International Rubber Study Group at Copenhagen, beginning May 11. They will be present as advisers to the American delegates, Willis Armstrong and his aide and alternate, George Alexander, both of the United States State Department. Probably vying with the formal agenda for the attention of other national delegates will be the presence, for the first time, of a member of the U. S. Congress, Paul Shafer (Rep., Mich.), chairman of the House Armed Services rubber subcommittee, who will be accompanied by John Blandford, legal counsel to the Armed Services Committee. Mr. Shafer will attend at the invitation of the State Department, who asked the Speaker of the House to name a Congressman to attend the session at Copenhagen.

The "buffer stock" proposal will be on the agenda as a result of a report to the RSG by its Working Party designated last year to look into means of preventing both "burdensome surpluses or serious shortages" of rubber. The Working Party met last August and again in January in London and came up with the conclusion that a "buffer stock" of natural rubber would be a practicable way of achieving these twin aims. It will be up to the RSG at Copenhagen to decide whether a "buffer stock" is desirable or necessary—and that is where the big argument will come.

No "buffer stock" plan has been announced as yet—the difficult details would have to come through negotiation when, and if, the idea of having a "buffer stock" is approved by member governments of RSG. The basic idea, however, is pretty generally known. Consuming and producing nations would set up an organization empowered to buy natural rubber whenever the market price fell below some predetermined "floor" and to sell whenever the market exceeded some predetermined "ceiling." Thus, rubber coming into the "buffer stock" in times of surplus would be available to consumers in times of shortage.

Thus far the principal support for a "buffer stock" scheme, whose major purpose is to stabilize the market, has come from Indonesia, and the plan generally has the support of smallholder producers, whose production costs frequently are considerably higher than those of the more efficient estate plantations. Smallholders are the first to suffer when prices are depressed because of surplus supplies.

Opposition has been expressed by the American rubber goods manufacturing industry—the largest single consumer of natural rubber—as well as by some British

estate interests. Our State Department is, at best, lukewarm to the idea and probably would oppose its adoption. The British Government is believed to feel that, while stabilization is desirable, the "buffer stock" method is unworkable. Natural rubber producers generally appear to be relying on the possibility of a higher price for synthetic rubber under private ownership to lead the way to a sufficiently high market price for natural rubber to sell profitably.

The following are the arguments likely to be raised at Copenhagen by the American representatives:

1. A "buffer stock" is a cartel under another name and is contrary to American foreign trade policy, which is against artificial restrictions on production and prices. Experience with the earlier Stevenson scheme of the '20's and the International Rubber Regulation Plan of the following decade indicates that consumers stand to lose while the benefits to producers are transitory, at best.

2. A "buffer stock" probably will be difficult and costly to operate. The interests of natural rubber producers would be better served if the funds and energy were used to replant old trees with higher-yielding stock, thus making for adequate future supplies of low-cost natural rubber, which could compete without the need of artificial price floors geared to protecting the high-cost producers.

3. Statistical forecasts indicate that only small surpluses of natural rubber are foreseeable this year and through 1954 and 1955. Supply should equal demand in the following year, and thereafter demand will exceed presently foreseeable supplies, with deficits rising from about 60,000 tons in 1957 to 250,000 tons in 1960. The apparent surpluses of this year and next could be eliminated, without requiring any increase in consumption, by increasing the present free stock from the present six-month supply to a 6.5-month supply. Alternatively these apparent surpluses could be absorbed by American consumers, if natural rubber is priced competitively with synthetics. The statistical projections on availability indicate that natural rubber could have 45% of the American market over the next two or three years, instead of the present 40%.

For one thing, the rubber industry believes the production of synthetic rubber may drop to about 600,000 tons a year in the period immediately following disposal by the government, which may take place some time in 1954. In time, 700,000 tons a year could be produced from present facilities based on petroleum butadiene, chiefly by using more oil extenders. As worldwide demand for new rubber rises, additional synthetic plants will be built. Availability factors alone, the industry believes, will require a consumption of some 1,200,000 tons of synthetics in America in 1960, out of a total new rubber use of some 1,600,000 tons. The outlook is for natural rubber production to remain at its current annual level of 1,700,000 tons; while consumption of new rubber elsewhere than America will rise to about 1,400,000 tons. About 100,000 tons of this demand will be met by synthetics produced outside America, leaving only 400,000 tons of natural rubber for American consumers. In summary, with shortages rather than surpluses a permanent long-range prospect for natural rubber, there will be no need of artificial price floors.

4. America's synthetic rubber industry is already providing protection against serious shortages or burdensome surpluses. Synthetic rubber output in the past has been geared to fill the supply gap caused in periods of natural rubber shortages (it was created for that purpose). Production has fallen off, when plenty of natural rubber was available for consumers. This flexibility has worked imperfectly, however, because of government policy here to assure minimum production levels in synthetic plants, and the frequent lag of production schedule changes in keeping step with changing supply conditions. It will work much better, the industry believes, when the synthetic rubber industry is privately owned. Synthetic rubber production levels then will be more sensitive to market factors, promising a balance in worldwide supply and demand for total new rubber.

5. A "buffer stock" of natural rubber probably will create, rather than prevent, surpluses. For the "buffer stock" to keep supply and demand in balance would require "floor" prices for natural be kept at all times competitive with synthetic rubber. If the floors are higher, demand for cheaper synthetics will go up, while demand for natural rubber will fall. But, because the "buffer stock" will be available to buy natural rubber, producers will sell to the "buffer stock," rather than cut production to restore a balance between supply and demand. Thus a "buffer stock" geared to stabilizing natural rubber prices at a high enough level to satisfy the marginal, high-cost producers would encourage more rapid expansion of synthetic rubber production than otherwise might occur. It also would result in a growing store of natural rubber in a buffer stock, which would hang over the market, tending to prevent a normal adjustment in prices. This growing supply could not be released into consumer channels except by government controls requiring its use, and such controls would be resisted by consumers in peacetime.

Rubber Production and Consumption

Sales of government synthetic rubber hit a new peak in March, totaling 76,146 long tons, about 10,000 tons higher than the previous record set in January. GR-S accounted for most of the gain, as sales totaled 68,202.4 tons. Butyl sales were up to 7,943.6 tons. RFC sent congratulatory letters to nine plants which set new production records in March, far exceeding their normal producing capacities.

The March sales figures reflect the unusually heavy activity in tire factories. RFC's tentative production schedule for April—65,900 tons for GR-S and 7,200 tons for butyl—is not far behind the production realized in March and is no lower than the March tentative production schedule released during that month.

March sales of synthetic rubber as reported by the RFC were: GR-S, net weight plus oil but exclusive of carbon black, 68,202.4 tons, which was made up of LTP GR-S, 50,977.5 tons; black masterbatch (gross weight), 9,375.5 tons; oil masterbatch (gross weight), 12,581.2 tons; oil-black masterbatch, 1,943.8 tons; GR-S latex, 3,997.6 tons.

Scheduled production for April was for 65,900 tons of GR-S, broken down as follows: LTP GR-S, 42,125; black masterbatch, 8,000 tons; oil masterbatch, 13,250 tons; oil-black masterbatch, 4,315 tons; latex, 4,315 tons.

The figures reflect a steady rise in the production of LTP GR-S and of polymers containing oil extenders.

The RFC announced on March 31 the purchase of 16,400,000 gallons of alcohol for use in producing butadiene at the two alcohol-butadiene facilities. Although offered substantially more, the agency did not buy the full 20-million gallons it had announced it intended to buy. The chief reason was that the offers over 16.4-million gallons were at higher prices—sufficiently higher to warrant their rejection, in RFC's view. These offers included some from French alcohol producers.

RMA announced April 21 that the rubber industry had established a new monthly high consumption record during March, when 128,237 long tons of new rubber were used. This compares with the 113,820 long tons used during February and the 120,576 long tons during January, the previous record month for the industry. Prior to 1953, the high record month had been October, 1950, for consumption of 119,844 long tons of new rubber.

RMA reported that the use of natural rubber during March increased 12% to 50,339 long tons from the 44,960 long tons used during February. Synthetic rubber used amounted to 77,898 long tons, an increase of about 13% above the previous month's total of 68,860 tons. A breakdown of synthetic rubber consumption showed the amount used by types in March as: GR-S, 62,687 tons; neoprene, 5,845 tons; butyl, 7,983; and nitrile types, 1,383 tons.

FTC Tire Discount Ruling Scheduled for May

A Federal Court of Appeals panel heard, in April, two large tire merchandisers contend that they will lose business if the Federal Trade Commission's quantity discount limit order for replacement tires and tubes is permitted to go into effect.

Attorneys for Montgomery-Ward testified that the company would lose its market and its cost-plus contract with a manufacturer; while attorneys for American Oil Co. said its tire business would be destroyed unless the FTC order is set aside.

Amoco said that Mansfield Tire & Rubber Co., supplier of the tires sold through 14,500 Amoco service-station outlets, had put the oil firm on notice that it would cancel its cost-plus contract with Amoco if the quantity limit rule took effect.

Ward and Amoco appeared along with major tire firms in the day-long hearing to ask the Court of Appeals to reverse a lower court ruling denying judicial appeal at this time of the quantity limit rule. Last November, Federal District Judge Mathew McGuire refused review on the grounds that the quantity limit rule must be in effect before the companies can claim they are injured by it.

Ward's counsel declared that his company would suffer "irreparable injury" if the ruling were allowed to go into effect because, it told the Appellate Court, under these circumstances, it would no longer be able to price competitively. Some of Ward's competitors would not be bound by the quantity limit rule because they buy from manufacturers which have no other sales outlets.

The quantity limit rule, issued more than a year ago, would limit quantity discounts on manufacturers' sales of replacement tires and tubes to the maximum discount offered by each manufacturer on a single shipment of a single 20,000-pound carload. The order was issued to protect small independent tire dealers and is being fought by some larger independent dealers as well as manufacturers and large merchandisers.

The hearing before the Appellate Court took place April 6 and was the first action

in the case to take place since the appointment of Edward Howrey as chairman of the Commission, putting control of the Commission in the hands of a conservative majority. Mr. Howrey, because of his active interest in the case prior to his government appointment (he was counsel for Firestone Tire & Rubber Co., one of the firms contesting the FTC ruling), announced he would take no part in Commission decisions on the quantity limit ruling.

The Commission attorney at the hearing stood fast to the government's previous position, that the quantity limit ruling should be permitted to go into effect. The issue now before the Appellate Court is whether to require Judge McGuire to consider questions of the legality of the quantity limit rule before the ruling is permitted to go into effect. The rule now is in abeyance pending a decision from the Appellate Court. If the court upholds Judge McGuire, it is expected that the FTC will ask him to allow the ruling to take effect immediately. The Appellate Court members which heard argument on the case are Judges Wilbur Miller, George T. Washington, and E. Barrett Prettyman. Their decision is expected to be handed down in May.

FTC-Davol Agreement

FTC announced April 22 that Davol Rubber Co., Providence, R. I., has agreed to stop claiming that the "Davol 'Anti-Colic' Nurser" is the only nurser that regulates the flow of milk in infant feeding. The company agreed to stop making this claim in a stipulation it signed with FTC.

The company also agreed, FTC announced, to stop stating in its labeling material, cartons, advertisements, or other printed matter that its product is "patented" unless the product, or some essential part of it, actually is covered by a valid, subsisting patent owned or controlled by Davol.

The stipulation permits the company, however, to make such patent claims if patents were issued and have expired, provided that the fact that the patent had expired is plainly indicated on labeling material and other printed matter.

The stipulation was approved by the Commission under its policy of encouraging law observance through cooperation—rather than punitive court action—in cases where violation occurs without *intent* to defraud or mislead through false advertising claims.

Pale Crepe Released for Shoe Products

In an amendment to Order M-2 the National Production Authority on March 26 eliminated restrictions limiting use and consumption of 1X and 1 pale crepe rubber in the manufacture of shoes, shoe soles, heels, welting, and wrapping.

The action was aimed at alleviating hardship on rubber and shoe manufacturers, who complained that inability to use pale crepe has caused unemployment and idling of equipment.

NPA said requirements of the pale crepe grades for the national stockpile are completely covered by contracts, and the present supply is in close enough balance to permit the relaxation.

The limitation on the use of pale crepe in tire manufacture was not lifted, however, because of the heavy tonnage involved.

OIT Removes Export Control on Polystyrene

The Office of International Trade announced on April 1 that styrene polymer (polystyrene) may be exported to all areas except Iron Curtain countries, China, Hong Kong, and Macao, without export licenses. OIT said that export controls no longer were needed either for strategic or supply reasons.

The agency noted, however, that validated export licenses are still required to export polydichlorostyrene and copolymers containing styrene (such as GR-S). The commodities removed from export controls by the April 1 action include the straight polystyrene molding and extrusion compositions, as well as emulsions, sheeting, and extrusions, and other unfinished forms of polystyrene resins.

Other National News

International Conference on Natural Rubber Quality Suggested

The March issue of "Natural Rubber News," publication of the Natural Rubber Bureau, Washington, D. C., includes a suggestion that an early international meeting of all the principal elements of the producing, consuming, and other elements of the natural rubber business should be held with the view of ironing out the current unsatisfactory claim situations, disagreements, and misunderstandings which seem to plague buyer, seller, and middleman alike.

Reference was made to the improvement in the quality of Malayan rubber since last fall that has been arriving in this country, but the Malayan problem was considered to be only a part of the whole picture.

Among the basic problems mentioned to be handled by such a conference were:

(1) The adoption by all three elements of the business of a uniform grading system was recommended. The Rubber Manufacturers Association type samples are used more generally than any other measuring stick, but they are by no means in universal use in all markets, it was said. NRB hazarded a guess that not more than half the registered packers in each of the several producing countries in the Far East had ever seen a set of official RMA type samples.

It was emphasized that agreement should be reached on one set of standards and the use of these standards in all markets both contractually and for quality.

(2) Agreement was also called for on standard contracts to cover each of the common forms of transactions, i.e., f.o.b., c. & f., c.i.f., etc.

(3) Agreement on practical packing specifications which can be followed by the Far Eastern shipper, taking into account the packing materials available to him and also the consumer's cleanliness requirements, was also called for.

(4) The formation of international arbitration panels which would by their composition and rules be fair and equitable to all concerned, was the final problem presented.

Any such conference should be made up entirely of business elements with governments playing no direct part, the NRB said.

Then the April issue of "Natural Rubber News" included a letter, dated March 13, addressed to Warren S. Lockwood, president, Natural Rubber Bureau, from W. J. Sears, vice president, The Rubber Manufacturers Association, Inc., and R. D. Young, president, Rubber Trade Association of N. Y., in which reference was made to the above-mentioned suggestion for an international meeting for discussing type samples, packing and marketing procedures and other matters of related interest.

Sears and Young stated that the suggestion for an international meeting of this sort was considered and approved at a joint meeting of the crude rubber committees of the RTA and the RMA on January 29, 1953, and that it was hoped that arrangements could be made for the meeting in New York within the next few months.

It is understood, however, that the Far Eastern packers and shippers invited the RMA and the RTA to send representatives to the Far East during April or May, and that these associations replied that the time was not convenient.

Humphreys Sees Continued Industry Boom

H. E. Humphreys, Jr., chairman of the board, United States Rubber Co., told that company's stockholders at the annual meeting in New York, N. Y., April 21, that as the industry approaches 100% civilian output again, with government controls removed, the outlook is for even greater volume than during the so-called "defense boom."

"We expect the industry to sell 93 million civilian automotive tires, an increase of 13% over 1952," he said. "We also look for increasing demand for foam rubber mattresses and cushioning, rubber footwear, chemicals and plastics. In line with the general high level of industrial activity, business should remain good in conveyor belts, hose, extruded and molded items and other industrial rubber products.

"In all of these lines of business, U. S. Rubber is prepared to produce and sell fully as large a portion of the total as it has in the past. You can see that we do not expect any appreciable turndown in business this year. In fact, we plan to continue our modernization and expansion program at about the same high level as last year when we had capital expenditures of $26 million.

"Competition in the rubber business is becoming keener, requiring greater sales effort and greater sales expense. But, with much more freedom from government controls, there is a stronger incentive at all levels of management to improve operating efficiency and quality, so as to bring ever better products to customers."

Mr. Humphreys said that his company was optimistic about the future of synthetic rubber and was happy to notice that President Eisenhower has asked Congress to enact legislation authorizing the dis-

posal of government owned synthetic plants to private industry.

"We hope Congress will pass enabling legislation within the next few months so that synthetic rubber will take its proper place in our economy as soon as possible," he added.

He sounded a note of caution, however, on proposals relating to the international commodity agreements on rubber, labeling the "buffer stock" plan being discussed by the International Rubber Study Group, "a scheme for worldwide control of natural rubber prices."

"The 'buffer stock' plan would be equivalent to a subsidy program on an international basis," he declared. "It would mean increased costs for rubber in the end. These costs, plus the cost of administering the program, would be passed on to the consumer of rubber products in the form of higher prices. This means mainly the American consumer, since he consumes the lion's share of the world's rubber production.

"As a nation, the United States should be vitally interested in the economic well-being of the Far Eastern rubber producing countries. This is essental if those countries are to avoid Communist dominaton. But I do not believe that the best way to do this is to demand that the American consumer pay artificially high prices for rubber."

It was revealed that U. S. Rubber established another new sales record of more than $225 million during the first quarter of 1953, and earnings are estimated to be at least $7 million, 12% ahead of the figure for the same quarter in 1952.

"Sales volume for the rest of the year will remain high," Mr. Humphreys said. "Later quarters may not quite come up to the first; however, sales for the whole year will probably surpass the record set in 1952."

Firestone Opposes "Buffer Stock" Scheme

In a statement on April 22, as he sailed aboard the *Queen Elizabeth* to attend the International Rubber Conference in Copenhagen, and the International Conference of Manufacturers in Paris, France, and also to tour Firestone plants abroad, Harvey S. Firestone, Jr., chairman of the board of the Firestone company, opposed the "buffer stock" plan for natural rubber to be presented before the Rubber Study Group; he endorsed the recommendation of President Eisenhower that the American synthetic rubber plants be sold to private industry.

Mr. Firestone referred to testimony he had given before various Congressional committees since 1947, in which he urged that the synthetic rubber industry be placed under the competitive free-enterprise system.

With regard to the "buffer stock" scheme, Mr. Firestone provided answers to the three questions discussed by the Working Party of the Rubber Study Group in its deliberations prior to the May meeting of the Study Group in Copenhagen. These questions were: (1) Will there be a surplus of natural rubber in the predictable future? (2) Are measures designed to prevent a surplus both desirable and necessary? (3) What measures should be taken?

While there may be surpluses of total rubber in 1953 and 1954 of about 72,000 long tons annually, and in 1955 of about 58,000 tons, there will be none in 1956, it was said. During the 1953-1955 period the surpluses will be less than 5% of natural rubber production of 1,700,000 long tons and cannot be called burdensome. A deficit of 60,000 tons of rubber in 1957 may be expected, and this figure may increase to 250,000 tons in 1960.

The best assurance of a continuing and stable market for natural rubber producers is the maintenance of a policy of allowing their products to sell at competitive prices with synthetic rubber, and of increasing their yields and improving quality of product, rather than the adoption of a commodity agreement such as the "buffer stock" scheme. Also, a shortage growing continually more serious is the main concern.

Mr. Firestone said that measures designed to prevent surpluses of natural rubber were neither desirable nor necessary because they violate the principles of the competitive free-enterprise system, under which American business and industry have grown and prospered. In addition, estimates of world rubber consumption indicate that all the natural rubber produced during the next 10 years will find a ready market, provided it is competitively priced. A "buffer stock" plan, therefore, is not necessary.

In fact, the creation of a "buffer stock" for natural rubber, while synthetic rubber would continue to be governed by the natural laws of supply and demand, might result in natural rubber losing a part of its present market position, it was added. Any natural rubber acquired by a "buffer stock" is withheld from the market and is, therefore, not available to prospective buyers.

During the next 10 years the competition within the field of synthetic rubber will be keen to improve the uses to which it can be put, its quality, and its price. If the producers of natural rubber wish to share in this progress they should, beginning at once, move to meet the competition of synthetic rubber. This policy can be met only by more efficient operation, by large-scale replacement of old, low-yielding trees with young, high-yielding stock, and by planting new areas, Mr. Firestone pointed out.

The solution of the situation is the one the American industry has always given, that is, let the forces of a free competitive market govern. Only in such manner will progress be made, Mr. Firestone said in conclusion.

O'Neil Condemns International Politics in Rubber

William O'Neil, president of The General Tire & Rubber Co., keynoted his position on the buffer stock proposal before leaving April 24 for the Copenhagen meeting of the Rubber Study Group by asking that international politics be divorced from the rubber business so that natural rubber could seek its own level of demand.

"You can't erase speculators from the market, but the United States rubber industry has had enough bitter experience with ward heeling on an international scale to want to force politics completely out of the natural rubber picture," averred the General Tire president.

"With disposal of U. S. government synthetic plants imminent—and taking into account the tremendous strides in synthetic rubber by private industry—the time has arrived when both rubber companies and producers are no longer faced with the gamble of the plunging and skyrocketing price structure of natural rubber.

"For sound economic reasons alone, our industry simply can't afford to exhibit even token partiality for a commodity which has been bumped up to $1.26 a pound and bumped back to 8¢ a pound, all within the same year, by international politicos," he declared.

O'Neil foresees a sizable reduction in the current demand for natural rubber, and a slight decrease in price, but admits that natural rubber will always have a place in the American economy, particularly in specialized cases where it is definitely superior.

In commenting on President Eisenhower's recent recommendation to sell government synthetic plants to private industry, O'Neil went on record as saying that "now we can begin operating like normal people, not as poor relations."

Government in any business is bad, and its invasion of the rubber business was no exception. Under private competitive enterprise—the traditional American way of doing business—the public will reap the benefits of more extensive research into future applications of synthetic rubber, it was said.

Sounding a warning to the natural rubber interests, O'Neil repeated his stand that they must drive a wedge between their product and international politics or suffer an inevitable decline in market demand for natural rubber.

"Let nobody cloud the issue at stake," O'Neil concluded. "Natural rubber, mixed with international politics, has tough sledding ahead."

U. S. Rubber Signs New Contract with URWA

U. S. Rubber and the United Rubber Workers, CIO, signed a new contract on working conditions on April 5, which ended a two-day strike of 35,000 workers in 19 company plants.

The new contract will remain in force until March 31, 1955. It provides for two weeks' paid vacations for employes after three years of service, liberalized grievance procedures, and methods for negotiating intra-plant inequities.

A company-financed insurance program was added which provides hospital, medical, and surgical benefits for employes and their dependents. Full details of this program have to be worked out.

The walkout started on April 2. The old contract, extended for 24 hours by company and union representatives in an effort to reach a settlement, had expired at midnight April 1.

At no time during the strike did the company and the union officially break off their negotiations which had been in progress in New York since March 2. Except for several recesses, talks continued throughout the day and evening hours of April 2 and 3, even though the old contract had expired and workers had left their jobs.

The new contract must be ratified by a majority of the 19 local unions. The agreement contains a 60-day reopening clause with the right to cancel the entire agreement if a settlement cannot be reached.

DPA Tax Certificates

Certificates for rapid (five-year) tax amortization were granted to firms in the

rubber, plastics, and associated industries between March 4 and 19, by the Defense Production Administration. The location, the product or service, the total amount involved, and the percentage to which the rapid tax amortization may be applied are given below:

Simplex Wire & Cable Co., Newington, N. H., submarine cable, $1,999,000 at 65%.

Johnson & Johnson, New Brunswick, N. J., surgical sponge for the military services, $214,600 at 40%.

New Jersey Zinc Co. of Pa., Palmerton, Pa., titanium dioxide, $15,000,000 at 45%.

United States Rubber Co., Chicopee Falls, Mass., and Los Angeles, Calif., military-type tires, $1,583,728 at 40% and $690,460 at 50%, respectively; U. S. Rubber, Bristol, R. I., components for military end items (two certificates), $34,653 at 50% and $13,957 at 50%, respectively.

Armstrong Cork Co., South Braintree, Mass., molded rubber products for defense use, $1,411,000 at 45%.

Lord Mfg. Co., Erie, Pa., aircraft parts, $82,287 at 65%.

Chicago Molded Products Corp., Chicago, Ill., ethyl cellulose inhibitor tape, $73,055 at 60%.

Goodyear Aircraft Corp., Litchfield Park, Ariz., airship and aircraft parts, $123,781 at 65%.

Mansfield Stock Ownership

The Mansfield Tire & Rubber Co., Mansfield, O., has filed a registration statement with the Securities & Exchange Commission which contemplates a major change in the stock ownership of the company.

James H. Hoffman, president, stated that the stock transaction involves 249,066 shares of Mansfield stock, of which 237,600 shares are owned by The General Tire & Rubber Co. and 11,466 shares by W. J. Coughlin, a General Tire distributor.

Mansfield management personnel proposes to purchase 49,066 shares, and the remaining 200,000 shares will be offered to the public by a group of underwriters, headed by A. G. Becker & Co., Inc.

Mr. Hoffman further declared that certain working agreements between Mansfield and General, dealing with research, tire testing, development, and certain other operations, will be continued.

Mansfield manufactures automobile, truck, bus and farm tires, and tubes for replacement use. Its operations fall into two principal categories—manufacture and distribution of tires and tubes under its own or controlled brands, and the manufacture of similar products under private brand for oil companies, mail-order houses, and others. These private-brand customers who have been purchasing from Mansfield for various periods to more than 30 years include such companies as Pure Oil Co., Montgomery Ward & Co., and American Oil Co.

Ball Acquires Kent Plastics

Ball Bros. Co., Inc., Muncie, Ind., has acquired a majority interest in Kent Plastics Corp., Evansville, Ind., in exchange for a cash investment made in underwriting an expansion of the plastics firm.

Kent's management policies and personnel will remain unchanged, it was announced. The company, which employs approximately 500 people, produces parts for the automotive and home appliance industries.

Seiberling Annual Meeting

Stockholders of Seiberling Rubber Co., Akron, O., were advised that the company now owns 99.4% of the capital stock of the Seiberling Rubber Co. of Canada, Ltd., Toronto, Ont., and that it expects to acquire 100% ownership in the near future. This announcement was made by J. P. Seiberling, president and chairman of the board, at the annual meeting of stockholders on April 13.

All directors of the organization were reelected for another year. They are: J. P. Seiberling; Robert Guinther, company counsel; A. C. Blinn, T. Tyler Sweeny, H. P. Schrank, R. J. Thomas, L. M. Seiberling, and C. E. Jones, company vice presidents; and Willard P. Seiberling, secretary.

In announcing the company's increased ownership in the Canadian subsidiary, Mr. Seiberling said previous ownership had been limited to 84.5%. The change in status was brought about by an offer to minority stockholders of the Canadian company to exchange their stock for stock in the Akron company on the basis of two shares of parent company stock for one share of the Canadian company stock.

Then the directors at their annual meeting on April 20 returned all officers to their positions for another year. Those reelected include J. P. Seiberling, president and chairman of the board; Mr. Schrank, vice president in charge of production; L. M. Seiberling, vice president in charge of sales; Mr. Thomas, vice president and treasurer; Mr. Jones, vice president and comptroller; W. P. Seiberling, secretary; H. E. Thomas, assistant secretary-treasurer; and J. W. Dessecker, assistant secretary.

Scrap Institute Elects

The Scrap Rubber Institute met on March 16 as part of the fortieth anniversary meeting of the National Association of Waste Material Dealers, Inc., on March 16-18 at the Conrad Hilton Hotel, Chicago, Ill. The Institute meeting featured the election of officers and a panel discussion on industry conditions.

New Institute officers for the coming two years follow: president, Milton Kushkin, A. Schulman, Inc.; vice president, Samuel Tanney, Tanney-Costello, Inc.; and acting secretary-treasurer, George W. Reid, of the Association staff. Outgoing President Henry M. Rose, H. Muehlstein & Co., reported on Institute activities during the past year and received a rising vote of thanks for his services to the group during the past four years.

As a result of the panel discussion on the new specification for scrap rubber issued by the Rubber Reclaimers Association, the Institute appointed a committee to study the specifications and discuss them with the reclaimers. A committee was also appointed to increase Institute membership and attendance at meetings. This committee is composed of James K. McElligot, A. Schulman; Richard Meehan, Muehlstein; and George Woloch, George Woloch Co.

Dayton Rubber History

The history of the Dayton Rubber Co., Dayton, O., is the subject of a story in the March 15 issue of the *Royle Forum*, published by John Royle & Sons, Paterson, N. J. Interesting background material on the company, its important decisions and its major products, is presented beginning with its inception in 1905.

Dayton grew over the years from a one-story plant with 22 men to its present facilities of three plants with approximately 3,000 employes, plus a controlling interest in a foam latex manufacturing concern. Its first major product, the low air pressure cord tire of 1923, is considered to have established Dayton's reputation in the tire field. Since then the firm has entered into other fields, including printing, textiles, specialties, and automotive belting.

This diversity of products is a result of a company decision in 1920 to spread its activities over many fields. A general grouping of products finds most of them in the non-durable class which requires replacement. The program formulated in that year provided for this type of production and, further, it specified that emphasis should be placed on rubber products engineered and developed as part of a machine or mechanical operation.

The interests of the company turned toward synthetics in 1931, with the development of Dayco synthetic rubber printing rollers. The synthetic rubber material, produced in collaboration with du Pont, was used in printing rollers as an improvement over natural rubber. At present, Dayton is one of the eight rubber companies which form Copolymer Corp. The company was instrumental in beginning the corporation during World War II and has helped in this capacity to develop "cold rubber" which has found wide application in many industries.

Aerojet-General Corp. Formed

Aerojet Engineering Corp., Azusa, Calif., and Crosley Motors, Inc., Cincinnati, O., have announced their merger into the Aerojet-General Corp. William O'Neil was elected president of the new firm. Mr. O'Neil is also president and chairman of the board of directors of The General Tire & Rubber Co., Akron, O., majority stockholder of both Aerojet and Crosley. Vice presidents of the consolidated company are D. A. Kimball and A. H. Rude. Other officers include F. W. Knowlton, secretary; T. S. Clark, treasurer; T. E. Beehan and R. I. McKenzie, assistant secretary-treasurers; and W. E. Zisch, assistant secretary.

The new organization, with a stated capital of $6,683,167, will manufacture JATO units and plans in the future to produce the metal parts for JATO and other forward firing rockets.

Extra-Soft Gaskets

Bolted steel storage tanks used by Army Engineers in combat areas for storing fuels, oils, and water are reportedly employing new extra-soft gaskets compounded of Hycar rubber to effect a seal between overlaps. The gasketing material was developed by Thermoid Corp., Trenton, N. J., in cooperation with the Engineering Research & Development Laboratories, Ft. Belvoir, Md.

Special fillet radii bending gaskets are used to seal the horizontal seams of the tanks at points of stave overlap, while chine gaskets seal corner points and those areas at which three or more plates or segments overlap. Units which employ these gaskets are of capacities ranging from 100 to 10,000 barrels (420,000 gallons).

Quits Guayule Operations

Intercontinental Rubber Co., Inc., 50 Broad St., New York 4, N. Y., in its recent report to shareholders announced that it had discontinued the production of guayule rubber on May 14, 1952, because it had proved unprofitable; the company believes that only another national emergency would make possible profitable guayule production in Mexico. The company, therefore, is seeking a business that will profitably utilize its Torreon plant and its facilities.

Liquidation of the Cedros property, which suspended operations in 1948, was also completed last year. Obsolescence, inadequate transportation, and scarcity of shrub in the area made future operations unadvisable. The remoteness of the plant and its unsuitability for other industrial purposes discourage any business there.

Intercontinental recently acquired the mining rights for three fluorspar deposits and is producing and offering for sale metallurgical grades of fluorspar.

The company also reported that operation of its Sumatra plantation last year resulted in an output of about 400 tons of natural rubber, a slight increase over 1951 production.

Nippon-Aires Agreement

Nippon Titanium Co., Tokyo, Japan, and R. S. Aires & Associates, 400 Madison Ave., New York 17, N. Y., have announced a joint technical assistance agreement to build a titanium oxide plant in Hiratsuka, Japan. The plant, designed by engineers of both firms, will manufacture several grades of the white pigment from waste blast-furnace slag at an expected rate of 150 tons a month by the end of 1953 and double that production for next year. The Aires organization will participate in the Japanese concern by stock ownership and will continue to supply engineering services in expanding production and in making available new types of titanium pigments to the plant.

Chemical Marketing Service

Foster D. Snell, Inc., 29 W. 15th St., New York 11, N. Y., has announced the availability of a chemical marketing service for market researchers covering information on any particular chemical company, chemicals, or specific industry. Called the CMR File Summary, the new service will be a compilation of material taken from the company's monthly abstract, *The Chemical Market Report*, and other marketing periodicals.

Pratt & Whitney, West Hartford, Conn., has relocated its Chicago branch office in new, larger quarters at 4649 W. Fullerton Ave., Chicago 39, Ill. This new building was specially planned and erected to provide better facilities for carrying a more comprehensive Chicago stock of regularly listed P&W cutting tools and gages and to give adequate office area for the factory-trained sales and service personnel associated with the large line of precision machine tools, cutting tools, and gages produced by Pratt & Whitney and its subsidiary, Potter & Johnston Co., Pawtucket, R. I.

Raymond C. Firestone *(Left)* and Harvey S. Firestone, Jr., Demonstrating Weight Differences between New Tubeless Tire-Drop-Center Rim Combination and Conventional Tire and Rim Assembly

Freedoms Foundations Honors

The Firestone Tire & Rubber Co., Akron, O., and its chairman, Harvey S. Firestone, Jr., have received two honors from the Freedoms Foundation. An honor medal in the public address category was awarded to Mr. Firestone for his talk, "The Bonds of Brotherhood." The company was given the top award in the employe publications field, and Mary Kerrigan, supervising editor for the publications, received a personal honor medal. J. E. Trainer, vice president in charge of production, accepted the award for the company from Vice President Richard Nixon at recent ceremonies at the Foundation's headquarters in Valley Forge, Pa.

Tubeless Truck Tire

Firestone has developed a tubeless truck tire and a one-piece, drop-center rim on which to mount the tire. The tire, said to weigh less than the conventional inner-tube type, contains an air-impervious inner liner as a vulcanized part of the casing. Tread, body and sidewall construction are essentially the same as for tires now in use although the bead construction of the tubeless tire differs from conventional design.

The new drop-center rim is also said to be lighter than the present-type rim owing to a reduction in the height of the flanges. The smaller flange affords sufficient force to secure the tubeless tire to the rim since the tire is assembled on to it by a force-taper fit. It is claimed that mounting the tire is much simpler with these products than with the conventional tire and rim.

The unit assembly of tubeless tire plus new rim is reported to permit a weight saving of approximately 360 pounds for a 10-wheel tractor-trailer combination. The present 9.00-20 tire and conventional rim weigh 170 pounds *versus* 134 pounds for the new assembly, thus saving 36 pounds per wheel.

The new tire and rim can be made to fit hub and wheel mountings of trucks now in use and will give identical clearances between the wheel and the body of the truck as is now obtained.

Tubeless Aircraft Tire

The first tubeless tire for the main wheels of aircraft, also developed by Firestone, has reportedly been successfully flight tested by the Navy after having been subjected to 200 simulated landings in the company's laboratories. The new tire is made of nylon fabric with a special bead construction, similar to that employed on passenger cars, to seal the tire to the rim. The main significance of this development is said to be the possible elimination of time, money, and space required by the military for purchasing, shipping, and storage of tubes. In addition, a weight saving of seven to 125 pounds per plane, depending on the size and number of tires used, may be realized by employing these tires since each tire is said to be 20% lighter than the postwar rayon tire and tube of comparable size.

Material Handling Clinic

A traveling clinic, sponsored by the Material Handling Institute and held in cooperation with the New York City and New Jersey chapters of the American Material Handling Society, will convene at the Hotel Statler in New York, N. Y., on June 10. First in a series expected to be held in other major cities in 1953, the clinic will attempt to develop among users a better understanding of the correct application of material handling equipment to industrial problems.

The one-day meeting in New York will feature five panel discussions, to be held concurrently, on handling by large trucks, floor trucks, cranes and hoists, and by conveyors, and strapping and baling. Six specialists in each of these fields are expected to be present to answer questions from the audience.

Rubber-Metal Bonding Firm

Eco Engineering Co., Newark, N. J., has announced the availability of its research, development, and specialized production facilities for the manufacture of difficult shapes involving the bonding of natural and synthetic rubbers to metal. By the use of a reportedly improved technique parts up to 3½ inches in diameter can be produced having a bonding strength in excess of the strength of the rubber itself. Principal applications for this activity include the bonding of parts for pumps, valves, meters, pneumatic and hydraulic equipment, and electronic devices.

Desk Calculator

A six-page, pocket-size folder which presents formulae, constants, and conversion factors useful in basic engineering, blast cleaning, and dust control calculations has been made available by Pangborn Corp., Hagerstown, Md. Included in this Calculator is information on shot and grit sizes, formulae for dust control work, guides for determining tank capacities in gallons, and metric measurements and conversion factors.

Arrowhead Rubber Co. is expanding its Long Beach, Calif., plant to add 20,000 additional square feet of floor space and facilities to the factory, according to C. W. Froude, general manager. It was reported that a large percentage of the total productive capacity of the Arrowhead plants goes into silicone ruuber-impregnated fiberglass products used on military and commercial airplanes. Arrowhead is a division of National Motor Bearing Co.

General Tire Elections

Stockholders of The General Tire & Rubber Co. reappointed 13 directors and named F. W. Knowlton to the board in their annual meeting last month at Akron, O.

Reappointed directors are: W., C. F., M. G., and T. F. O'Neil, W. E. Fouse, C. J. Jahant, Robert Iredell, L. A. McQueen, S. S. Poor, B. E. Smith, J. F. Creamer, E. W. Ross, and D. A. Kimball.

The directors, in their annual meeting, reelected all officers, including W. O'Neil, president, the executive head of the company since its beginning in 1915; Mr. McQueen, vice president in charge of sales; C. F. O'Neil, vice president in charge of foreign operations; Mr. Kimball, Mr. Jahant, T. F. O'Neil, and H. A. Bellows, vice presidents; M. G. O'Neil, executive assistant to the president; T. S. Clark, treasurer; Mr. Knowlton, secretary and chief counsel; James Little, assistant treasurer.

The directors also named C. A. Hill assistant treasurer, and J. L. Wade assistant secretary.

In reporting to the shareholders, W. O'Neil said: "Our sales for the first quarter of 1953 are 10.13% greater than a year ago while our profits are up 2.09% despite the fact that the figures do not include General's radio and television report or most of our foreign operations."

Sales for the first quarter of 1953 total $44,130,274. The estimated income is $1,509,780. General's 1952 sales were $185,914,247.

Knowlton, secretary and general counsel since 1951, has been with General Tire since 1929, and was named assistant secretary in 1940. Knowlton is also secretary and director of two General subsidiaries—Aerojet-General Corp. and General Teleradio, Inc.

Wade has been in General's legal department since 1943, handling federal tax work for the company.

Hill has been a member of the company's treasurer's department since 1945.

Expansion Plans Accepted

The directors at their annual meeting also approved the company's plans for expansion in the chemical, foam rubber, and rigid plastics fields.

Major steps in General's overall expansion program, the transactions include the sale of General's stock interest in the Mansfield Tire & Rubber Co., the building of a multi-million dollar chemical plant near Ashtabula, O., the broadening of its foam-rubber operations, now at Logansport, Ind., and the opening of a rigid plastics division at Marion, Ind.

General's interest in Mansfield includes 237,000 shares of common stock, and the proceeds realized from this sale will be used to carry out General's expansion program. The president and other executives of the Mansfield company will purchase a large portion of the Mansfield stock being offered by General.

General's second chemical facility near Ashtabula—a plant is now in operation at Mogadore, O.—will include a polyvinyl chloride resin plant and pilot plant. Estimated cost of the project will be approximately $6,000,000, according to President O'Neil.

Ground will be broken in the next few weeks at the plant site, a 50-acre tract of land in Ashtabula township northeast of Ashtabula. This project will be supervised by General's central engineering department, with Scientific Design Co., Inc., in charge of design engineering of production facilities. General Tire's chemical division will operate the plant.

The foam-rubber operation is expected to be in full production by midsummer.

Appointment of Harold Harmon as works manager of the Marion division was also announced by Mr. O'Neil.

Process of retooling of Marion facilities has already started. First shipments of plastics products to be manufactured have already been completed through pilot-plant operations at General's Wabash and Logansport plants.

Air Spring for Trucks

General Tire has developed a new suspension-type air spring for trucks. This spring is basically an inflated rubber bellows with automatically controlled operating pressures. The device fits between the axle and the frame of the vehicle and results in an even distribution of loads over the entire frame. Other advantages claimed for the new spring are reduced spring weight, cushioned ride, reduced vibration, and longer tire life. At present, the spring is available only for tandem-axle trailers although adaptations for other vehicles are reported to be in the testing stage.

Huber at Gates Technical Club

In a recent address at the monthly meeting of the Gates Rubber Co. Technical Club at the Park Lane Hotel, Denver, Colo., Hans Huber, president of J. M. Huber Corp., Borger, Tex., spoke on the history of man and described it as one marked by destruction—destruction of humans through wars and of natural resources through waste and negligence. He expressed the hope that the next chapter in the earth's history would be filled with great achievements in the fields of sociology and science. In honor of his talk, Mr. Huber was presented with a life membership in the Club.

New Sales Representative

Felix F. Salamon, Castle Heights Ave., Nyack, N. Y., has organized The F. F. Salamon Co. to act as manufacturers' representative on selected chemicals. The principal area of operations will be southern Connecticut, Metropolitan New York, New Jersey, and the eastern section of New York State. The company at present is representing Beacon Chemical Industries, Inc., Cambridge, Mass. Other chemicals, mainly for rubber, plastics, and related industries, will be added by Salamon.

For more than 20 years Mr. Salamon had been employed by Binney & Smith Co. and had been in charge of sales of the rubber compounding accessories department. In his new capacity he will be particularly interested in the development of new and improved materials and the improvement of processing operations.

Sharples Chemicals, Inc., 123 S. Broad St., Philadelphia 9, Pa., has announced that Richard N. Williams has been assigned to its Chicago regional sales office. He will service a midwestern territory and will work out of St. Louis.

Donald C. Waterman has been assigned to the company's New York regional sales office and is currently on special assignments.

Moving Western Headquarters

The administrative headquarters of the Western Division of Monsanto Chemical Co., St. Louis, Mo., will shift to Santa Clara, Calif., from Seattle, Wash., according to General Manager Irving C. Smith.

The division will construct a central administrative headquarters building at 2790 Lafayette St., Santa Clara. Upon its completion about 20 general administrative and staff department personnel will be transferred to the new location from Seattle.

Site of the new building is adjacent to the company's plant and a short distance from Monsanto's most recent major expansion project at Avon, Calif., where a new plant for the production of sulphuric acid, in partnership with Tide Water Associated Oil Co. recently started production. A phenol plant, with capacity sufficient to serve Monsanto Pacific Coast customers as well as Monsanto's own requirements, also is under construction at Avon.

Other recent expansions include plant facilities at Long Beach, Calif., for the manufacture of Lustrex polystyrene and Krilium soil conditioner. A plant for the manufacture of vanillin has just been completed in Seattle.

Seattle will continue to be sales and production headquarters for Monsanto's plywood adhesives, industrial resins, and related products for the lumber and plywood field. Total Monsanto employment in Seattle is now 160, as compared to 116 in 1951.

The Midwest sales office of Monsanto's Texas Division, now at Akron, O., has been moved to the company's sales offices in the Union Commerce Bldg., Cleveland, O., according to R. U. Haslanger, general manager of sales.

John Clopton, the division's Midwest sales representative, said the move will permit better servicing of the increasing number of customers for the division's styrene, vinyl chloride, and acrylonitrile monomers.

The products are widely used in the manufacture of plastics, synthetic rubber, paints, adhesives, and synthetic fibers.

Werkheiser in New Post

Robert L. Werkheiser has been named Chicago representative for Monsanto's industrial resins sales department and will service customers in Minnesota and Wisconsin, as well as those in Chicago. Werkheiser has been in the division's research department since 1949. Before joining Monsanto, he was a research chemist with Interlake Chemical Co.

Safety Glass Innerlayer Output Up

A 50% expansion in the production of Saflex vinyl butyral film for use in the manufacture of safety glass for the automobile industry has been announced by Monsanto at Springfield, Mass. This expansion follows a 20% production increase completed earlier this year on the same material.

The plastic is produced in clear or graduated green-tinted sheets. The glass manufacturers then laminate the film between glass layers to produce shatterproof windows and windshields.

The company, which reportedly supplies 60% of the domestic market, has indicated that the increased use of glass in cars, and also legislation requiring the use of safety glass in windshields have made this expansion necessary.

Chemical Plants Dedicated

The conversion over a seven-year period of the farming community of Calvert City, Ky., into an industrial center was completed April 18 by the dedication of three new chemical plants. The plants are the $8,000,000 chlorine-caustic soda facilities of Pennsylvania Salt Mfg. Co.; the $10,000,000 calcium carbide and acetylene generating plant of National Carbide Co., division of Air Reduction Co.; and the $6,000,000 vinyl chloride plant of the B. F. Goodrich Chemical Co., Cleveland, O. Directors and officers of the firms and of the Illinois Central Railroad, as well as Governor Lawrence Wetherby, toured the plants following the ceremonies.

The Goodrich facilities manufacture vinyl chloride monomers for shipment to the company's plants at Avon Lake, O., and Louisville, Ky., for conversion into Geon resins. Raw materials for the production of the monomer are obtained by pipeline from the nearby plants of the other two companies. The Goodrich plant under the direction of Tom B. Nantz began operations in February and is expected to attain its full production capacity during the summer months.

Hycar Rubber Valves

More than 1,000,000 liquefied petroleum gas regulators have been manufactured by Fischer Governor Co., Marshalltown, Iowa, using inner valves made of Hycar, a product of Goodrich Chemical. The Hycar rubber compound, which selectively adheres to brass valve stems, was developed by Associated Rubber, Inc., Quakertown, Pa. Nylon fabric diaphragms coated with Hycar are also used in these pressure-reducing units for rural propane or butane gas tank fuel systems.

Rubber-Bottom Golf Bags

Atlantic Products Corp., Trenton, N. J., is currently producing a golf bag, Par-Bag, made of rubber compounded with Goodrich Chemical's Good-rite Resin 50. The molded rubber bottom guaranteed to outlast the bag itself, is claimed to have improved hardness, abrasion, and wear resistance properties due to the addition of the resin to the natural rubber compound used.

Explains K-700

The function of Good-rite K-700 (sodium polyacrylate) as a basic ingredient in soil conditioning agents is reported by Goodrich Chemical to be similar to that of the naturally occurring polyuronide compounds. The polyuronides are produced in the soil in minute quantities by oxidation and bacterial breakdown of the organic matter; they bind together clay particles into aggregates and stabilize existing aggregates which were formed by cultivation. The development of Good-rite K-700 as an economical substitute for these compounds is a result of the company's research program to determine new uses, methods of application, and handling procedures for substances useful in the soil conditioner industry.

Adhesives Dispensing Tube

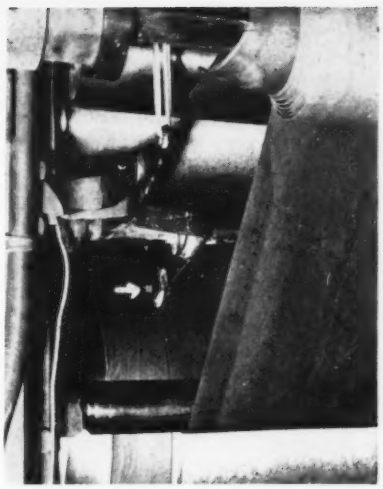
Bond Adhesives Co., Brooklyn, N. Y., is marketing several of its cements in a new type of collapsible tube. This Thin Line & Dot tube has a needle-like tip for dispensing cement in a very fine line or in dots; the tube is expected to find use in gluing operations which take place in confined spaces or on small objects. Six types of cement are presently available in this container, including Pliobond #20 and #30, general-purpose adhesives of the Goodyear Tire & Rubber Co., for which Bond is East Coast distributor.

Stanley H. Holmes Co., 440 N. Sacramento Blvd., Chicago 12, Ill., manufacturer of hydraulic presses, rotary stock cutters, crude rubber bale cutters, and sponge rubber vulcanizing presses, has leased additional space in a separate building near its main plant and has relocated the assembly area in the new quarters. The extra facilities were needed to keep apace with the steady increase in production during past months, according to Stanley H. Holmes, president of the company.

Stein, Hall & Co., Inc., 285 Madison Ave., New York, N. Y., was awarded The City of New York Certificate of Business Merit by Mayor Vincent R. Impelliteri at a recent presentation ceremony at City Hall. Morris S. Rosenthal, president of the company, accepted the Certificate, which proclaimed, "Signal honor and recognition to Stein, Hall & Co., Inc., for eminent community service, for distinguished contribution to the economic welfare of the people of the City of New York, and for playing a vital role in the commercial development of the City of New York for the past 75 years."

Schwartz Chemical Co., Inc., New York, N. Y., has appointed as its West Coast distributor Plastics Materials Supply Co., 9156 E. Las Tunas Dr., Temple City, Calif. The supply company will handle Schwartz' complete line of "Rez-N-Brand" products, which include coating materials, dyes, cements, and cleaners for plastic fabricators.

Goodrich's New Vinyl Chloride Monomer Plant, Calvert City, Ky.



Nylon Knife Slitting Rubber Sheet on Steel Calender Roll

Nylon Knife

A nylon circular knife has been developed by The Polymer Corp. of Pennsylvania, Reading, Pa., for slitting rubber sheets on steel calender rolls. The knife is said to have been used successfully to trim selvage edges and to cut rubber sheeting varying in thickness from 0.005- to 0.175-inch. Reduction in maintenance expense is reported by users since the knives do not injure the steel rolls.

The blades are cut from 2½-inch-diameter Polypenco nylon rod supplied by the manufacturer and must be tapered from the hub to the cutting edge before they can be used. One disadvantage encountered with their use is the frequent sharpening required for best results.

New Converse Warehouse

To handle more efficiently an increasing demand for its waterproof, sporting, athletic, and fashioned rubber footwear, Converse Rubber Co., Malden, Mass., recently acquired a four-story building at 574 Boston Ave., Medford, Mass., for use primarily as warehouse and shipping space. This building, containing more than 90,000 square feet of floor space, now serves exclusively to warehouse finished Converse merchandise and as shipping point for all Converse footwear. This centralized warehouse also permits consolidation of warehoused stocks formerly located at several overflow points.

Acquisition of this building has released a substantial amount of space at the Malden plant of Converse Rubber. This space is now being utilized solely for manufacturing purposes, enabling Converse to increase the output of its nationally advertised canvas and waterproof footwear.

The Flek Corp., 2252 E. 37th St., Los Angeles 58, Calif., has been appointed by Visking Corp., Terre Haute, Ind., its West Coast distributor of extruded layflat tubing made from Kel-F fluorochlorocarbon resins. The distributor will have available a full range of widths and thicknesses from 0.002- to 0.010-inch of both the plasticized and unplasticized types of the material, which is marketed under the name Trithene.

Safety Council Awards

The National Safety Council, Chicago, Ill., has announced the 1952 award winners for the annual Rubber Section safety contest. The Council states that 153 contestants operated 410,514,000 manhours for the past year, during which time 2,085 injuries were experienced This figure represents a 12% decrease in injuries as compared with that for the 1951 contest

The final cumulative average accident-frequency rate for all contestants was also lower by 12% than that of the previous contest, marking the first decrease in the past three years of competition The decrease is attributed to greater familiarity of labor with the equipment used by new companies in the contest

The Rubber Section safety contest is broken down into divisions depending on the average monthly manhours' exposure of the contestants as follows: Division 1, over 400,000; Division 2, 200,000-400,000; Division 3, 100,000-200,000; Division 4, 50,000-100,000; Division 5, under 50,000.

Final standings and accident-frequency rates of the winners in the various divisions follow:

Division 1: first place, Goodyear Tire & Rubber Co., England, 0.50 rate; second place, Firestone Tire & Rubber Co., Akron, Plant #2, 0.60 rate; third place, Firestone, Akron Plant #1, 0.79 rate.

Division 2: first place, B. F. Goodrich Co., Tuscaloosa plant, 0.72 rate; second place, Goodrich, Oaks plant, 0.82 rate; third place, Goodrich, Akron aeronautical division, 1.06 rate.

Division 3: first place, Electric Hose & Rubber Co., Wilmington, Del., 0.51 rate; second place, Humble Oil & Refining Co., Houston, 0.62 rate; third place United States Rubber Co., Milan plant, 0.64 rate.

Division 4: tied for first place, all with rates of 0.00: B. F. Goodrich Chemical Co., Port Neches; Goodrich, Clarksville plant; U. S. Rubber, Naugatuck, Conn.; and Kentucky Synthetic Rubber Corp., Louisville.

Division 5: tied for first place, all with rates of 0.00: Goodyear, Quebec-Ind. Centre #5; Firestone Plastics Co., Pottstown, Pa.; Firestone, Akron research laboratory and Christchurch, New Zealand; Armstrong Cork Co., South Gate, Calif.; Goodrich, Du Bois plant; Flintkote Co., Whippany plant; Flintkote Co. of Canada, Ltd., New Toronto plant; and U. S. Rubber, Manchester plant, Burlington plant, and Fabric Fire Hose Co. (subsidiary), Sandy Hook, Conn.

In addition to the above awards, certificates of achievement were given in the various divisions for the greatest numerical reduction in frequency rate and in the fifth division for a perfect record in working less than 72,000 manhours during the contest. The former awards were made to the following companies in the first, second, third, fourth, and fifth divisions, respectively: Gates Rubber Co., Denver; Goodyear, St. Marys plant; Goodyear, New Bedford plant; Goodyear, Luxembourg; and Ideal Roller & Mfg. Co., Chicago. The certificate for the perfect record was given to Lobl Mfg Co., Middleboro, Mass.

Award of Honor for Firestone

A record accident frequency rate of 1.8 has earned for Firestone Tire & Rubber Co., Akron, O., the highest honor in industrial safety, the National Safety Council's Award of Honor. The award, presented on a company-wide basis, marks the seventh time in eight years that Firestone has received this safety honor. The new rate represents a decrease of 7.5% over the previous record which was set by Firestone in 1951 and is well below the national average of 5.9 accidents per million manhours worked. In order to qualify for the award, industries must record frequency and severity rates of at least 40% and 30%, respectively, below the national average figures. Firestone's rates were 69% below par for frequency and 38% below for severity.

New Firm Producing Coated Fabrics and Diaphragms

Duroflex, Inc., new entry into the synthetic diaphragm and coated fabric field, has started production in its plant at Buena Vista, Va. Heading the new corporation is President Edward C. Hemes, formerly executive vice president and a director of Vulcan Rubber Products, Inc. Prior to his association with Vulcan in 1946, Mr. Hemes had been superintendent of distribution with the Milwaukee Gas Light Co.

The new concern has been formed primarily to service and supply the gas utility industry with meter, regulator, and other control diaphragms.

Associated with the new company as production manager of the diaphragm department is Hubert E. Francis, who has been credited with the development of one of the first molded-type meter diaphragms and who has made numerous subsequent contributions to the meter and regulator industry.

The firm also produces diaphragms for the automotive and aircraft industries and a full line of coated fabrics for general industrial use.

Tread and Sidewall Patching Material

A dual-cushioned high-tensile patching material for tire tread and sidewall repairs has been added to the repair materials of Seiberling Rubber Co., Akron, O. The new patch has its rayon body coated on the bottom side with a special heat-resisting gum, said to eliminate tire failures due to heat "blows." The top side is coated with conventional black cushion gum. The patch is available in all sizes up to and including 44 by 44 inches.

Supply Contracts Awarded

Armed Services Textile & Apparel Procurement Agency, 111 E. 16th St., New York 3, N. Y., recently announced the awarding of the following contracts for: *insulated rubber combat boots*: Hood Rubber Co., Watertown, Mass., 82,000 pairs, value, $948,450.60, Goodyear Rubber Co., Middletown, Conn., 14,000 pairs, $159,460; *protective clothing (welders', divers', and battery room)*: Fibre-Metal Products Co., Chester Pa., 275, $2,315.95; Olympic Glove Co., New York, 750, $2,443.50; American Optical Co., Southbridge, Mass., 2,205, $14,736.60; Hodgman Rubber Co., Framingham Mass., 4,273, $60,002.53; Morse Diving Equipment Co., Boston, Mass., 520, $23,736.70; Diving Equipment & Supply Co., Milwaukee, Wis., 200, $11,710; Lite Mfg. Co., Inc., New York, 1,800, $26,460; United States Rubber Co., Washington, Ind., 330, $28,912.30.

Goodyear Aircraft Changes

The subcontract projects sales department of Goodyear Aircraft Corp., Akron, O., has been reorganized in that a field representative at Seattle, Wash., has been established and the responsibilities of four staff representatives in the Akron sales offices have been realized. The move is intended to provide service to aircraft manufacturers along the pattern followed by the parent firm's approach to the automotive industry.

Those men involved in the changes include W. F. Luce, now responsible for sales, service, and project coordination in his newly created Seattle post; F. W. Dover, responsible for canopy and laminates sales; G. R. Beaumont, metal products sales; G. R. Galehouse, Bondolite and engineering and developmental sales; and Ben Flossie, responsible for all contract administration for the department.

The field representatives in New York, N. Y., Wichita, Kans., and Los Angeles, Calif., will remain unchanged. All personnel will report to D. E. Zesiger, manager of the department.

Promoted by Dayton

The Dayton Rubber Co., Dayton, O., has promoted two of its executives. Paul J. Mayle, comptroller, has been named vice president and assistant secretary. Myron S. Kem, chief accountant, has been advanced to comptroller and assistant secretary.

Mayle will be responsible for the administration of financial operation of the company, including budget administration; while Kem will handle all accounting procedures, including internal audits and controls.

Mayle has been with Dayton since 1935. He formerly was secretary-treasurer of McClaren Rubber Co., Charlotte, N. C.

Kem came from Wall, Cassel & Croneweg, a public accounting firm, in 1937.

Seminar on Standardization

John Gaillard, staff member of the American Standards Association, will conduct a five-day private seminar on industrial standardization, starting June 22, at the Engineering Societies Bldg., New York, N. Y. The seminars have attracted representatives of more than 100 companies since their inception in 1947; they follow the usual procedure of lecture and subsequent discussion period. Futher information may be obtained from Dr. Gaillard, 400 W. 118th St., New York 27, N. Y.

Plastic Soil Conditioners

The Midwest Institute of Park Executives Educational Conference, held recently in Chicago, heard an address on plastic soil conditioners by Harry N. Stevens, director of biochemical research, the B. F. Goodrich Co., Akron, O. Mr. Stevens stated that although all the problems confronting soil experts will take years to solve, many available compounds can contribute much toward eliminating unfavorable soil conditions. In this respect, he discussed the uses for two plastic materials, sodium polyacrylate and calcium acrylate, in removing the hard crust from clay soils and in providing a load-bearing surface for dirt roads.

Naugatuck's New Executives

Several major organizational changes in Naugatuck Chemical Division, United States Rubber Co., Rockefeller Center, New York 20, N. Y., were announced last month.

Earle S. Ebers, sales manager of Kralastic and Vibrin resins, was named director of research and development to replace M. G. Shepard, who has retired.

D. Lorin Schoene, manager of plastics development, was appointed assistant director of research and development.

Dr. Ebers joined U. S. Rubber in 1937 as a research chemist in the general laboratories at Passaic, N. J., and for nine years was engaged in fundamental and applied research on rubber and plastics. In 1946 he became manager of plastics development for Naugatuck Chemical, and in 1949 he was appointed to the sales post he is leaving for his new assignment.

Dr. Schoene started with the rubber company in 1939 as a chemist in the general laboratories and shortly afterward was transferred to the Far East, where he became a group leader in chemical development concerned with the processing of natural rubber latex. In 1942 he was made a research chemist for Naugatuck Chemical and in 1947 was named manager of organic research for the Division. In 1951, Dr. Schoene was appointed manager of plastics development.

Harold M. Parsekian, formerly sales manager for Marvinol vinyl resins, has been appointed sales manager for all plastics manufactured by the Naugatuck Division and will supervise sales for Marvinol vinyl resins, Kralastic styrene copolymer molding and extrusion powders, Vibrin polyester resins, and other plastic raw materials manufactured by the division.

Mr. Parsekian joined Naugatuck Chemical in 1950 when U. S. Rubber purchased the assets of the chemical division, Glenn L. Martin Co. He had been director of sales and technical service for this division. Mr. Parsekian is a member of the American Chemical Society, Commercial Chemical Development Association, Society of the Plastics Industry, and Society of Plastics Engineers.

Donald E. Fowler has been named to the new post of assistant sales manager of the latex and aqueous dispersions group; while Thomas D. Ramsey and Bradley A. Smith have been appointed technical sales representatives on the West Coast; Lawrence H. Bruce, technical sales representative in the New York area, and Arnold P. Paulk, technical service manager at the Los Angeles plant.

Mr. Fowler, with Naugatuck Chemical since 1928, was formerly manager of the colloidal products research and development group. He has also been a research chemist in rubber chemicals, technical director of two company-operated government plants, assistant development manager, and administrative assistant to J. P. Coe, vice president and general manager.

Mr. Ramsey joined Naugatuck Chemical in 1946 and was formerly production engineer at the Los Angeles plant. Other company posts he has held include chemist in the Naugatuck synthetic rubber plant and in the Lotol development laboratory and assistant to the sales manager.

Mr. Smith, a group leader in the colloidal products research and development group, has been with the Division since 1951. Previously he had been a chemical engineer for approximately six years with Firestone Rubber Co. and also did development work and chemical engineering for two other firms.

Pach Bros.

Earle S. Ebers

Mr. Bruce, with Naugatuck Chemical approximately 10 years, was in the production department at the Connecticut plant for more than eight years, rising from a technical trainee to chief process engineer and then to assistant to the sales manager.

Mr. Paulk, with 11 years' service in the Division, was previously chief chemist at an ordnance plant operated by the company for the government, assistant control chemist and control chemist at the Naugatuck plant. For the past nine years he has been concerned with latex and latex products and has represented the company on several technical society committees.

To Erect Another Foam Rubber Plant

U. S. Rubber plans to build a large, new foam rubber manufacturing plant in Santa Ana, Calif., to meet the increasing demands for foam rubber products on the West Coast. The company expects to break ground, in June, on 54 acres of land, which it owns in the southern part of the city. According to present plans, manufacturing will start late this year. The plant will be devoted exclusively to the manufacture of U. S. Koylon foam rubber products.

The Santa Ana plant will be the rubber company's third manufacturing unit for foam rubber products and its sixth major expansion for the manufacture of Koylon foam since World War II. Other installations are in Mishawaka, Ind., and in Woonsocket, R. I.

Pach Bros.

Harold M. Parsekian

Research Site Rejected

U. S. Rubber on April 15 announced its withdrawal from negotiations to purchase land in Emerson, N. J., on which a research center was to have been built. Objections by residents of an adjacent community to the proposed center, notwithstanding company assurances that no factory buildings were to be erected, was given as the reason for the change in plans.

Parcells Promoted

Charles H. Parcells has been appointed assistant director of industrial relations. He has been in labor relations work for several years and has been supervisor of labor relations for U. S. Rubber since last year.

Robert E. Lowell, who succeeds Mr. Parcells, will be responsible for contract administration, labor arbitration, negotiations, and other matters pertaining to the field of union-management relations.

Harry J. Ingram has been named assistant supervisor of personnel and training and will work with divisional, factory, and branch representatives involved in the maintenance and improvement of company-wide personnel plans and programs.

Tire Division Changes

G. R. Cuthbertson has been appointed assistant production manager of the company's tire division, with headquarters in New York. Dr. Cuthbertson will be succeeded as factory manager of the company's Los Angeles plant by B. S. Adams.

Dr. Cuthbertson started with U. S. Rubber in 1936 as a research chemist. Later he rose to assistant director of the tire division's development department at Detroit before he was transferred to Los Angeles.

Mr. Adams has received virtually all of his business experience as a U. S. Rubber employe in the Los Angeles area. He started 27 years ago and subsequently progressed through jobs in the product control department and as a supervisor, foreman, and general foreman in the tire building division. Until his recent promotion he was general foreman of the tire building and curing divisions at the Los Angeles plant.

Chester W. Ort has been appointed assistant divisional manager of the western division of the U. S. Tires division. Mr. Ort, formerly district manager at Portland, Oreg., will establish headquarters in San Francisco, Calif., where he will give special emphasis to off-the-road tires and their distribution.

E. S. Morgan, district manager in Seattle, Oreg., succeeds Mr. Ort in Portland; while D. E. Kennedy, assistant district manager at Los Angeles, succeeds Mr. Morgan at Seattle.

Mr. Ort started with U. S. Rubber in 1913 and has held many offices, including those of branch manager, divisional sales manager, and district manager.

Mr. Morgan joined the company in 1937.

Mr. Kennedy started with U. S. Rubber in 1948.

Three new district managers in the Midwest, and two assistant district managers in the southern area were appointed last month in the U. S. tires division, as follows:

Edwin V. Murphy, assistant district

manager at Chicago, is now district manager at St. Louis; Harry E. Collins, assistant manager of truck tire sales in New York, becomes district manager at Minneapolis; and Harold U. McGee, who had been in truck tire sales at Kansas City, has been named district manager at Oklahoma City.

Wilburn B. Hooper, in truck tire sales at Charlotte, N. C., has been transferred to San Antonio as assistant district manager.

J. C. Barrows, truck tire salesman at Atlanta, has been made assistant district manager at that branch.

Winton in New Post

Harold M. Winton, training director for the mechanical goods division, has been named to the newly created post of sales development manager. Mr. Winton, with U. S. Rubber since 1946, for his new duties will head development and preparation of materials and programs to increase the effectiveness of the branch and commodity sales organization. His department will be responsible specifically for training sales personnel, assembling catalogs, sales promotion aids, and supervision of demonstrations, presentations, and sales meeting programs.

Day and Delehaunty Advanced

Edward T. Day has been named manager of branch sales for the mechanical goods division. Appointed at the same time was Matthew J. Delehaunty, who becomes manager of industrial sales. Both men will be headquartered in the New York offices.

Mr. Day has been affiliated with the sales department of the mechanical goods division since he joined U. S. Rubber in 1934. Successively with the Salt Lake, Chicago, and Los Angeles offices, he has been in New York since January, 1952.

Mr. Delehaunty, former sales manager for the Pittsburgh branch of mechanical goods, has been with the company since 1922 and has been associated with the rubber business since 1911. He became a division salesman in 1937 and Pittsburgh branch manager in 1949. In his new assignment he will be responsible for overall commodity sales of grinding wheels, conveyor and elevator belting, tank lining, roll covering, printers' materials, etc.

His successor in Pittsburgh is H. A. Lundberg, a salesman at that branch.

Fisk Boy in Giant Size

A number of new giant models of the "Fisk Boy," trade mark of Fisk Tires Division, U. S. Rubber, are being molded of Vibrin polyester resin and glass fiber by Bassons Industries Corp., Bronx, N. Y. The models, which are to be used as outdoor displays by Fisk distributors, will have the parts impregnated with color—the boy in gold, and the tire in black and white—and will be electrically wired so that the candle carried by the boy may be lighted.

Another Plastic Car

A new plastic car is being built by Rockfeller Sports Car Corp., Rockville Center, N. Y., which features a body made from Fiberglas and Vibrin polyester resin, a product of Naugatuck Chemical Division. The body is mounted on a modified frame to give a car that seats four passengers and has a 99-inch wheel base.

The plastic body is claimed to be tough, durable, and capable of withstanding considerable abuse without damage, but easily and economically repaired if ruptured. It is molded in five sections by Lunn Laminates, Huntington, N. Y., and is lacquered after assembly to facilitate matching of colors in the event of repair. Called the "Yankee," it was exhibited at the World Motor Sports Show at Madison Square Garden, New York, in late February.

Rubber-Plastic Wheels

An assembly of rubber and plastic is currently being used in the production of lawn mower wheels by the Newark Stove Co., Newark, N. J. The plastic wheel is molded in two sections of Kralastic, a product of Naugatuck Chemical. The sections are riveted together and assembled with a rubber tire to give a finished wheel weighing 18 ounces.

The wheel is said to be stronger and lighter than conventional cast-iron or aluminum wheels. Various tests have been conducted on it, including temperature tests at 220 and —16° F.; drop-tests with sufficient force to bounce the wheel 10 feet; and application of 70 pounds of pressure to wheels as they were rolled at 72 rpm. for 60 hours over ¼-inch lugs, with no adverse effects resulting.

New Fiberthin Distributors

U. S. Rubber has appointed United Tent & Supply Co., Los Angeles, Calif., and Colorado Tent & Awning Co., Denver, Colo., distributors of its tough, lightweight, flexible waterproof fabric known as Fiberthin. The new distributors will maintain stocks of the material at their respective locations.

Buys Future Plant Site

The B. F. Goodrich Co., Akron, O., recently purchased about 230 acres of land 11 miles from Defiance, O., as a possible future site for a plant, but has no present plans for construction there. This purchase is in line with the company policy of obtaining suitable plant locations in advance of the time they may be needed.

New Directors for Employe Relations

John N. Hart has been named director of employe relations for the Goodrich company in the United States. In the new assignment Hart, formerly acting director of personnel for the company in Akron, will be responsible for all corporate employe relation activities except union relations. He started with Goodrich in 1945 as a member of the business research department. He formerly had been a faculty member of Ohio State University, and director of research for the Ohio Department of Taxation.

In his new assignment Hart succeeds L. R. Keltner, director of employe relations since June, 1951, who becomes staff assistant to Vice President J. W. Keener with responsibility for special company projects. Keltner, with the company 27 years, had been manager of the Goodrich plant in Los Angeles before returning to Akron headquarters.

D. D. Reichow has been made the director of union relations for the company's operations in the United States.

Reichow joined Goodrich in 1925 and after four years in the Akron tire division was named division staff superintendent. In 1935 he became director of the employe training program in Akron and in 1937 joined the industrial relations department, being appointed manager in 1941. In 1946 he became assistant to the vice president—employe relations.

Tubeless Tires for Jets

Goodrich has announced the successful completion of preliminary flight tests on high-pressure tubeless tires for combat jet aircraft. The tires had been previously tested under simulated landing conditions in a laboratory at 2½ times the rated load of the tire.

The tubeless airplane tire is similar in basic construction principles to the company's tubeless tire for passenger cars. A layer of rubber inside the tire seals in air, and ridges molded on the outer side of the tire bead prevent loss of air around the rim flange. Special wheels featuring an O-ring seal are used with the aircraft tire to form an airtight chamber between tire and wheel.

Advantages claimed for the new aircraft tire over conventional types with tubes are safer high-speed takeoffs and landings, lighter weight, simplification of assembly and maintenance, and storage space saving due to the absence of tubes.

Moisture-Proof Zipper

Goodrich's pressure-sealing zipper, consisting of a pair of rubber lips which fold over the metal teeth of an ordinary zipper, are being used successfully on detachable plastic rear windows of two 1953 convertibles. Use of this fastener is claimed to facilitate ease of removal of the windows while keeping out moisture, dust, and dirt. Fabricating costs of installing the zipper are reportedly reduced, and the use of rubber lips of matching body tones contributes to the appearance of the car.

Goodyear Promotes Two

Announcement has been made of two promotions in the chemical division of the Goodyear Tire & Rubber Co., Akron, O.

John E. Warner has been appointed district manager of the division's St. Louis office, and Robert E. Kann, district manager for the Chicago area.

Warner joined Goodyear on the production squadron. He later became a sales trainee specializing in paints in the chemical division and in 1950 was named special representative to Chicago.

Kann became associated with Goodyear in 1951 as special representative in the chemical division's Midwest district office in Chicago. He has had wide experience in the rubber industry.

Tire Treads of Polyester-Diisocyanate Rubber

Goodyear announced that it is testing a control tire with tread sections made of Vulcollan-type polyester-diisocyanate rubber. Reported results after 5,000 miles of driving indicate that from two to five times greater wear resistance than the best tread rubber heretofore produced can be expected of the material. Economic production of raw material for its manufacture, and improved qualities of resilience and adhesion are problems which must be solved before the new composition can be used in large quantities.

Pliolite S-5 Paints

Goodyear recently published a 12-page illustrated booklet of helpful hints and recommendations on painting around home and farm buildings with paints containing Pliolite S-5. Surface preparations and application procedures are recommended for stucco, brick, asbestos shingles, concrete blocks and floors, metal surfaces, and plaster walls.

Rubber Guard Posts

Very high tensile rubber guard posts, manufactured by Goodyear, have been installed at a dangerous traffic intersection in Cuyahoga Falls, O. The posts consist of hollow rubber tubing, five feet long, fitted over an 18-inch steel tube which is imbedded into concrete. The steel core extends only a few inches above ground, permitting the rubber tubing to take the full impact in the event of vehicle collision. It is hoped that the new posts will either bend sufficiently to allow a vehicle to ride over them or slow the vehicle enough to prevent serious injury to its occupants.

Grounding Strap

A grounding strap for dissipating static charges which build up on moving vehicles is being produced by Goodyear's St. Marys, O., plant. Made of abrasion resistant synthetic rubber especially compounded to be conductive to electricity, the strap is available in 20-inch and 28-inch lengths, either one or two inches wide. It can be bolted on any normal chassis and can be extended by means of a fastened chain or wire to compensate for wear.

Extra-Long, Single-Flight Conveyor Belt

One of the world's longest, single-flight conveyor belts has been put into operation at U. S. Steel's Fairless Works in Morrisville, Pa. Built by Goodyear, the four-foot wide belt measures 5,500 feet from beginning to end and is constructed of especially compounded synthetic rubber and rayon fabric. This conveyor carries coke weighing 30 pounds per foot of belt and registering temperatures of approximately 250° F. from the coking plant to the blast furnaces at a rate of 300 feet per minute with a capacity rate of 400 tons per hour.

Wyrough & Loser, 801 Broad St. Bank Bldg., Trenton 8, N. J., has been appointed sales agent to the rubber industry in the Middle Atlantic States and New England for Shanco Plastics & Chemicals, Inc., Tonawanda, N. Y., manufacturer of thermosetting phenol-formaldehyde resins known as "Shanco Process Resins," among which are included rubber additives.

Charles W. Kline has been named New England division manager for Boston Woven Hose & Rubber Co., Cambridge, Mass., and will be responsible for the entire New England sales force. Mr. Kline, with the company 17 years, was industrial representative in the New York area from 1936 to 1944 and next was product manager of the belting department.

Shell Chemical Corp., New York, N. Y., has opened at Industry, Pa., a new storage and shipping terminal to give improved service to customers in the Pittsburgh area. The 15-acre terminal includes more than 2½ million gallons of storage facilities for acetone, alcohols, ketones, and other chemical products.

The Baker Castor Oil Co., 120 Broadway, New York 5, N. Y., has appointed Don S. Bolley technical director, and M. Kent Smith director of commercial chemical development. Mr. Bolley was formerly director of research, and Mr. Smith, director of development.

Plastics Firm Formed

Harry F. O'Hara and Edward W. Rowan have founded O'Hara-Rowan Associates, an organization intended to assist in the design and development of plastic products, particularly in the packaging field. The new firm, in the Bassett Bldg., Summit, N. J., has facilities for designing and model making and reportedly will take full responsibility for the manufacture of plastic products. O'Hara and Rowan were formerly secretary-treasurer and president, respectively, of Dillon-Beck Mfg. Co., Hillside, N. J.

Corrosion Testing Service

Kenneth Tator Associates, Coraopolis, Pa., is offering a corrosion testing service to manufacturers of protective coatings and other corrosion control devices. The new service provides for exposures of the client's products to various selected industrial atmospheres. Tests will be conducted within the client's plant and will attempt to determine objectively the merits of the manufacturer's products. This new operation of the firm supplements its existing similar service to users of corrosion-protective devices.

Akron Presform Mold Co. is expanding its plant in Cuyahoga Falls, O. Its manufacturing facilities will be increased by 15,000 square feet with the addition of a two-story building at one end of the plant, and a newly built wing at the other end. These additions will give the plant a total of 35,000 square feet of manufacturing area. Presform makes aluminum forms for latex-dipped products, aluminum and steel molds, dies for rubber as well as plastics and various types of rubber working machinery.

John J. Bolger has been appointed sales office manager of Boston Woven Hose & Rubber Co., Cambridge, Mass. The post was recently created to strengthen customer relations, expedite deliveries, and establish efficient controls for servicing inquiries and orders from customers and company personnel. Mr. Bolger has been with the company 12 years. Previously he had been materials foreman of Walsh Construction Co.

Martin Rubber Co., Inc., Long Branch, N. J., has added to its staff Norman Anderson as chemist and production control engineer and James Feehan as assistant plant supervisor in charge of time study and methods. Mr. Anderson was formerly with Kentile Rubber Co.; while Mr. Feehan comes from Architectural Tile Co.

Jacques A. Arrouet has been appointed fabric development engineer of United States Rubber Co. textile division, with headquarters in the company's general offices in New York, N. Y. Mr. Arrouet will be responsible for the development of certain engineered end-use textiles. He is joining the rubber company after recent experience with Collins & Aikman, where he was in charge of design and development of blended wearing apparel fabrics and was associated with the development of other special fabrics.

Rubber Printing Plate Gum

Stereotype Equipment Co., Chicago, Ill., has developed a new printing plate gum based on Hycar rubber, a product of B. F. Goodrich Chemical Co., Cleveland, O. Hycar is said to resist the deteriorating effects of mineral oil-based or aniline inks and is easily precision-molded into extra-long-wearing printing plates. The plates may be used for either letterpress or offset printing of any type of stock including cellophane, waxpaper, boxboard, and metal.

Polyethylene Price Reduced

A price reduction of 3¢ a pound for most polyethylene resins and compounds has been announced by Bakelite Co., a division of Union Carbide & Carbon Corp., New York, N. Y. This second reduction in seven months represents an overall decrease of 5¢ a pound since September 15, 1952, and places the current price at 44¢ for a pound of those base resins sold in the largest volume.

Acquires Upholstery Firm

The sales offices and business of Walter W. Metzger, Inc., distributor of Koroseal upholstery material to the transportation industry, have been acquired by the plastics products division of The B. F. Goodrich Co., Akron, O. A. W. Ketlar has been named manager of the offices, and Mr. Metzger remains with the business in a consulting role. The new operation, which will continue at Detroit, Mich., is expected to expand its activities into the entire automotive field in addition to the truck and bus trade.

Richard A. Batson has returned to Akron as senior staffman in the dealer department of The Goodyear Tire & Rubber Co. Batson, who recently completed a tour of active duty with the U. S. Air Force, joined Goodyear as service representative trainee in Albany in 1947 and shortly after was named district service representative there. He also served as a field representative trainee and field representative, with headquarters in Schenectady and later in Albany, before being recalled to military service in July, 1951.

Raybestos-Manhattan, Inc., Passaic, N. J., has announced that at a meeting held in April the board of directors elected W. S. Simpson vice president in charge of the Raybestos Division, and appointed M. A. Thompson, assistant comptroller of the corporation. At the same meeting J. H. Merrell, vice president, western sales division at Chicago, was awarded the 50-year service pin of Raybestos-Manhattan.

Martin T. Dillon has been appointed manager of the New York division of Boston Woven Hose & Rubber Co., Cambridge, Mass. Mr. Dillon, with the company 30 years, has devoted his entire career to sales in the New York area. Well known in the rubber and heavy construction industries, Mr. Dillon has specialized in supplying heavy-duty air hose and conveyor belts for dams, tunnels, and other heavy construction.

NEWS ABOUT PEOPLE

William W. Taylor has been appointed vice president in charge of all manufacturing operations for OPW Corp., Cincinnati, O., manufacturer of valves, fittings, and assemblies. Mr. Taylor comes to OPW from the Cincinnati Milling Machine Co., where he was a manufacturing executive. Over a period of more than 25 years he has had extensive experience as a manufacturing and industrial consultant specializing in methods time measurement techniques in England and America.

William W. Taylor

Jack W. Brandt has become plant appraisal accountant for The B. F. Goodrich Co., Akron, O., replacing Fred B. Eggleston, who has retired. Brandt has been with BFG since 1944, when he joined the company in Los Angeles. He has served as a project auditor on most of the company's large construction projects in the field. In 1948 he came to Akron on an assignment in connection with the building of BFG's new belt plant and also was an auditor in the final stages of the building of the company's research center at Brecksville. In his new assignment Brandt will supervise all cost work in connection with all of the company's major construction as well as plant inventory and assets.

Timothy W. Collins has been named general personnel director for Pittsburgh Plate Glass Co., Pittsburgh, Pa. Mr. Collins started with the company in 1945 as director of wage and salary administration and during the past three years served as coordinator of personnel administration. He had been associated with Crosley Corp. and Campbell Soup Co. in administrative personnel capacities for ten years prior to joining Pittsburgh Plate.

Ross W. Bennington has been appointed to the newly created position of general traffic manager of United States Rubber Co., Rockefeller Center, New York 20, N. Y. Mr. Bennington joined the company in 1939 as a rate clerk in the traffic department and was promoted to manager of the rate division in 1942. He will continue to have his headquarters at the company's general offices in Rockefeller Center.

Rolla H. Taylor has joined Scott Testers, Inc., Providence, R. I., as sales engineer specializing in the application of Scott testing equipment to the problems of the rubber industry. Mr. Taylor acquired an intimate knowledge of the problems and methods of testing rubber, through his association with the National Bureau of Standards commencing in 1930. He was largely responsible for the standardization of the Mooney viscometer in the synthetic rubber program from 1943 to 1948 and has subsequently been attached to the Bureau of Agricultural Industrial Chemistry of the United States Department of Agriculture, specializing in the evaluation of physical properties in the guayule rubber program. In addition, Mr. Taylor has been night school instructor in materials engineering at George Washington University, is the author of some 12 technical publications principally on rubber testing, has been active since 1942 on ASTM Committee D-11, and is an associate member of the Instrument Society of America and of the High Polymer Division of the American Physical Society.

Rolla H. Taylor

Henry F. Palmer, vice president of Kentucky Synthetic Rubber Co., recently was chosen "Boss of the Year" by the Stamford (Conn.) Chapter, National Secretaries Association.

DeWitt O. Myatt has been named to the newly created position of manager of development of Atlantic Research Corp., Alexandria, Va., and will coordinate the industrial research and development, marketing, and contract research programs of the company. He will be responsible also for technical staffing of the rapidly growing organization, organization policies for technical personnel, and public and community relations. Mr. Myatt joins Atlantic Research after seven years with the American Chemical Society as managing editor of *Industrial and Engineering Chemistry*. Prior to that he had been with the Tennessee Valley Authority, engaged in chemical engineering process development, technical report editing and writing, and technical administrative liaison work at TVA's Muscle Shoals, Ala., fertilizer plants and laboratories.

Samuel S. Board, Jr.

Samuel S. Board, Jr., has been made director of research of the Buffalo, N.Y., plant of Farrell-Birmingham Co., Ansonia, Conn. Mr. Board joined the company at Ansonia in 1938, completed its two-year student engineering course, and afterward worked in various engineering capacities, attaining the position of plant planning engineer in 1945. In 1947, Mr. Board was transferred to the Farrel Buffalo plant as assistant director of research.

James J. Healy, Harvard University professor and well-known labor arbitrator, has been retained as impartial umpire under the new contract recently signed by Goodyear Tire & Rubber Co. and the United Rubber Workers. Healy, who replaces **W. P. McCoy,** umpire under the former contract, was scheduled to begin hearing labor issues between the two parties about April 15. The new umpire was chosen by mutual agreement, after company and union representatives had considered a number of candidates.

William J. Smythe, formerly with Monsanto Chemical Co., has joined Elastomer Chemical Corp., Newark, N. J., as technical service manager.

R. A. Schatzel, vice president of engineering, Rome Cable Co., Rome, N. Y., was one of four wire and cable engineers representing the Wire & Cable Section of the National Electrical Manufacturers Association in a recent fact-finding forum on the problem of deviations in the current-carrying capacity tables of the Electrical Safety Orders of the Department of Safety of California from those of the National Electrical Code. The forums, held in Los Angeles and San Francisco, attempted to gain uniform acceptance of the NEC. Each of the four panel members discussed some phase of the problem involved. Mr. Schatzel spoke on the effect of temperature on insulation and illustrated some of the deleterious effects which may be obtained by line loading permitted by the California Safety Orders.

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CIRCOMAR-25 A heavy, viscous, dark liquid softener of the asphalt-flux type.	In the manufacture of tires of natural rubber, GR-S polymers, or blends of these two.
CIRCOMAR-110 A very low-cost soft asphaltum.	In the manufacture of tires.
SUNDEX-53 A low-cost, relatively aromatic product highly compatible with natural rubber and GR-S polymers.	In the manufacture of oil-extended polymers. In the processing of tires, rubber footwear, matting, toys, semihard rubbers, etc. In extending high Mooney viscosity Neoprene WHV.
SUNDEX-41 A complex dark-colored blend of high mol. wt. petroleum fractions and a specially prepared asphaltum, all derived from selected sources.	For processing "cold rubber."
516 RUBBER PROCESS AID A highly paraffinic type product.	In the manufacture of butyl inner tubes.
PDO 40 RECLAIMING AID A dark-colored product composed of polymerized olefinic hydrocarbons generally cyclic in character.	As a reclaiming agent.
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SUNOCO ANTI-CHEK A tailor-made petroleum wax.	For protecting rubber from surface cracking caused by sunlight, ultraviolet light, ozone.
SUNOCO WAXES 1290 Yellow 1290 Brown Carefully refined microcrystalline waxes having a melting point of about 180 F.	As mold releasing agents.

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E. T. Collinsworth, Jr.

E. T. Collinsworth, Jr., is now vice president of Velsicol Corp., Division of Arvey Corp., 330 E. Grand Ave., Chicago 11, Ill., and will act as administrative assistant for the chief operating executive of Velsicol, basic manufacturer of insecticide concentrates and petroleum resins and solvents. Mr. Collinsworth, a chemical engineer, was previously director of business research of Monsanto Chemical Co.'s phosphate division. He is a member of the American Management and the Chemical Market Research associations.

Cyril S. Kimball has been advanced from the position of vice president to executive vice president of Foster D. Snell, Inc., 29 W. 15th St., New York 11, N.Y. Mr. Kimball started with the company in 1926 and was made its vice president six years later. Mr. Kimball is a member of and has held office in the American Section of the Society of Chemical Industry, American Institute of Chemists, American Chemical Society, Chemical Specialties Manufacturers Association, The American Council of Commercial Laboratories, and the Society of Chemical Industry.

F. Brittain Kennedy, president and owner of F. Brittain Kennedy & Co., Boston investment firm for state and municipal securities, has been elected a director of Boston Woven Hose & Rubber Co., Cambridge, Mass.

Lyle F. Runciman, owner of Runciman Drug Stores, has sold out his drug business and become associated with Yale Rubber Mfg. Co., Sandusky, Mich., as executive vice president. Runciman, in the retail drug business in Detroit since 1922, was a co-founder of the Yale company and has been a stockholder since its inception. Yale manufactures molded and extruded rubber products for the automotive, farm equipment, home appliance, and other diversified industries. Besides the plant in Sandusky, the firm operates one in Lima, Peru, a jobbing branch in Detroit, and nine sales offices throughout the country.

Tilbert Reynolds has been made vice president and technical director of Stoner Rubber Co., Anaheim, Calif. He was formerly chief chemist of the concern.

William T. Baird, Jr., president of Baird Rubber & Trading Co., Inc., 233 Broadway, New York 7, N. Y., recently returned from a six-week business trip abroad, where he visited England, France, and Holland.

Raymond E. LaPlante has been named southwest district representative for the Bermico sales division of Brown Co., 150 Causeway St., Boston 14, Mass., and will also represent the pulp division in the sale of Solka-Floc. Mr. LaPlante, who will make his headquarters in Dallas, Tex., has been in the employ of Brown Co. for four years, serving in various capacities in the Bermico sales division.

Emil O. Jensen has been appointed vice president in charge of sales for Roth Rubber Co., Chicago, Ill. Mr. Jensen came to the company as general manager three years ago from Elkay Mfg. Roth Rubber processes and manufactures different types of rubber into specialized rubber products for railroads, aircraft, and other heavy industries. These products are sold by representatives all over the country.

Emil O. Jensen

Raymond W. McNamee, superintendent of the research and development department, Union Carbide & Carbon Chemicals Co., South Charleston, W. Va., has been chosen by the American Chemical Society's Georgia Section to receive the 1953 Herty Medal. The award, sponsored by the Chemistry Club of the Georgia State College for Women, is given annually for outstanding contributions to chemistry in the Southeast. The medal will be presented to Dr. McNamee at a campus celebration on May 2.

John J. Walbeck is the new manager of passenger tire and tube sales for Seiberling Rubber Co., Akron, O. Walbeck is being promoted from assistant manager of advertising and merchandising to fill the position left vacant by the death of John R. Lotze. Walbeck joined Seiberling in 1946 after four years in the advertising department of the Goodyear Tire & Rubber Co. He was in charge of dealer identification for Seiberling until 1950, when he was named assistant advertising and merchandising manager.

Robert W. Koch, director of purchases of The Firestone Tire & Rubber Co., Akron, O., has been named a Special Assistant to the Secretary of Defense; his assignment will be that of securing effective and efficient procurement methods and operations throughout the Department of Defense. Mr. Koch was employed by Firestone in 1925 in the purchasing division of Firestone Steel Products Co. In 1930 he was made purchasing agent for the parent company and in 1943, director of purchases. During his leave of absence, **Norman Smith,** purchasing agent for Firestone, will temporarily take over some of Mr. Koch's duties.

Harry R. Lloyd is now sales manager of the recently created molded rubber division of Spencer Rubber Products Co., Manchester, Conn., and he will direct all sales activities of the division, which manufactures precision molded rubber products. Mr. Lloyd was formerly general sales manager of Davidson Rubber Co. and before that was sales service manager of Sponge Rubber Products. His earlier experience had been gained as assistant to the sales manager of Spencer, Inc., and as assistant to the operating manager of Fisk Tires, a division of United States Rubber Co.

CANADA

Cabot Advances Delacour

Appointment of P. H. Delacour as vice president in charge of sales has been announced by the directorate of Cabot Carbon of Canada, Ltd., Canadian subsidiary of Godfrey L. Cabot, Inc., Boston, Mass.

F. Ronald Gorrie was named assistant sales manager of the Canadian organization.

Prior to the establishment and operation of this Cabot subsidiary, the firm of Delacour-Gorrie, Ltd., Toronto, Ont., directed by P. H. Delacour, president, and F. R. Gorrie, vice president, represented exclusive sales of all Cabot products in the Dominion. In January, 1953, Godfrey L. Cabot, Inc., announced the joining of Delacour-Gorrie with Cabot Carbon of Canada, including all personnel of the

P. H. Delacour

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former company. It was also announced that Cabot Carbon of Canada would represent sales for Canadian-produced Cabot oil furnace rubber blacks, and all types of carbon black, pine products, plasticizers, and other products of Godfrey L. Cabot, Inc. Production facilities are at Sarnia, Ont., and offices are in Montreal and Toronto.

Mr. Delacour's activities have been related to the sale of Cabot products in Canada for the past 25 years. Before the formation of Delacour-Gorrie he was a director of Harrisons & Crosfield (Canada), Ltd.

Rubber Business Good

Gross factory value of products manufactured by the Canadian rubber products industry soared to an all-time peak of $311,679,000 in 1951, contrasted with $239,185,000 for 1950, according to the Dominion Bureau of Statistics.

Sixty-seven establishments were in operation in 1951, furnishing employment to 23,054 persons who were paid $64,358,000 in salaries and wages, against 61 plants with 21,812 employes earning $54,263,000 in 1950. Cost of materials used was $146,952,000, compared with $101,773,000.

The 37 plants in Ontario, in 1951, employed almost 69% of the persons engaged in the industry and produced more than 82% of the entire output; while Quebec's 24 plants accounted for more than 31% of total employment and almost 18% of the total value of production.

Tires and tubes produced in the industry had a selling value of $176,348,000, compared with $135,896,000 the year before; rubber footwear, $43,527,000, against $33,615,000; and all other products, $91,804,000, against $69,674,000.

Adhesives Industry Report

Gross factory value of products manufactured by Canadian establishments comprising the adhesives industry in 1951 totaled $11,437,000, against the preceding year's figure of $9,679,000, according to the Dominion Bureau of Statistics. Twenty-nine concerns were in operation during 1951, giving employment to 714 persons, who were paid $1,972,600 in salaries and wages, against 28 plants with 669 workers earning $1,723,000 in 1950. Materials used in manufacturing processes cost $6,280,000, against $5,086,000.

Output of adhesives, including small amounts from other industries, in 1951 included: linoleum cement, 11,971,000 pounds at $606,000; rubber cement, 393,000 gallons at $893,000; casein glue, 871,000 pounds at $290,000; flexible glue, 1,949,000 pounds at $505,000; and synthetic resin glue, 14,802,000 pounds at $1,931,000.

R. M. Ferguson & Co., 81 Dunedin Dr., Toronto, Ont., will represent the chemical division of The General Tire & Rubber Co., Akron, O., in the sale of the following products: Gen-Tac Latex, Gen-Tac Resin, Ko-Blend IS, Kure-Blends, Kalabond, Actogen, Polystop A and K, Genpol Polyester Resins. R. M. Ferguson, well-known to the Canadian rubber industry since establishing his own organization in 1948, formerly served as assistant to the general manager of the chemical, latex, and reclaim division of Dominion Rubber Co., Ltd.

T. A. Luscombe has been appointed to the sales staff of W. C. Hardesty Co. of Canada, Ltd., New Toronto, Ont. Mr. Luscombe has many years' experience in the oils and fats, protective coatings, and the general chemical industries.

P. D. O'Rourke will be sales representative for all southwestern Ontario. Mr. O'Rourke has been with Hardesty for the past eight years in both production and sales.

OBITUARY

John A. Johnson

JOHN ALBIN JOHNSON, for many years factory manager of Hodgman Rubber Co., Framingham, Mass., died March 27 after a brief illness. During World War I he had suffered severe gas inhalation injuries. In 1939 these necessitated surgery on his lungs and were instrumental, when he contracted pneumonia recently, in causing his death.

Mr. Johnson was born in Bridgewater, Mass., on August 16, 1886. He attended Brighton, Mass., High School.

Prior to his military service he had been connected with Plymouth Rubber Co. After the war he was plant superintendent for Archer Strauss Rubber Co. and then factory manager for Hodgman. After 1939 the deceased was in semi-retirement, but acted as maintenance supervisor and consultant.

He belonged to the Boston Rubber Group, American Legion, and Elks.

Funeral services were conducted from his home in Wellesley Hills, Mass., followed by burial in Evergreen Cemetery, Brighton, on March 30.

No close relatives survive.

F. A. Meurin

FERDINAND ANTON MEURIN, 58, former sales development manager in the Dallas, Tex., district for The B. F. Goodrich Co., died in his home in Dallas, March 23. He had been district manager there for 20 years.

Meurin had more than 40 years of company service before retiring in February, 1952. He had joined Goodrich in 1911 as a shipping clerk in San Antonio. He saw military service during World War I as an artillery captain and following the war was a salesman in the Kansas City, San Antonio, and Dallas districts. In 1930 Meurin became Dallas district manager for Goodrich and retained that position until December, 1949, when he became Dallas sales development manager.

David A. Shirk

CORONARY occlusion caused the death, on March 11, of David A. Shirk, president and a founder of Rare Metal Products Co., Atglen, Pa., at his home in Lancaster, Pa. Although Mr. Shirk had been confined to his bed for the past five years because of a back injury, he continued active in the affairs of his company until he died.

He was born on October 14, 1892, in Lancaster, where he attended Yeates School. He received further education at Swarthmore Preparatory School, Carnegie Institute of Technology, and Cornell University.

The deceased became associated with Ralph E. Meyers in the manufacture of antimony sulfide in Glen Ridge, N. J., and in 1915 they formed Rare Metal Products Co. Operations were transferred to Belleville, N. J., in 1917 and to Atglen in 1946.

Mr. Shirk since 1926 was a member of the Division of Rubber Chemistry of the American Chemical Society and was also before his illness active in the New York Rubber Group.

Funeral services were held March 13 in Lancaster. Interment took place in Scranton, Pa.

Survivors include two daughters, two sisters, and five grandchildren.

Clifton G. Cashion

ON APRIL 9, Clifton G. Cashion, technical sales representative for the Xylos Rubber Co., division of the Firestone Tire & Rubber Co., Akron, O., died suddenly of a heart attack in an Akron hospital. He had been ill for some time.

Mr. Cashion was born in Indianapolis, Ind., January 17, 1905. He was a graduate of Akron University.

He started as a chemist at the Philadelphia Rubber division of The B. F. Goodrich Co. in Akron and later served as chief chemist at the R & H Rubber Co. in Los Angeles, Calif. He joined Firestone in Akron as a chemist on July 20, 1933.

The deceased was active on the SAE-ASTM committees on automotive rubber and also on ASTM committees. He belonged to the American Chemical Society, the Akron and the Detroit Rubber groups, and all Masonic bodies.

Funeral services took place in Akron on April 13, with burial in Rose Hill Cemetery.

Mr. Cashion leaves his wife, a son, and a daughter.

FINANCIAL

Amercan Cyanamid Co., New York, N. Y., and subsidiaries. January 1-March 31, 1953: net profit, $9,527,459, equal to $1.10 a common share, compared with $8,935,877, or $1.03 a share, in the same period last year; net sales, $102,832,189, against $93,880,859.

American Hard Rubber Co., New York, N. Y., and subsidiaries. For 1952: net income, $237,783, equal to 45¢ each on 273,609 common shares, contrasted with $725,545, or $3.45 each on 88,477 shares, the year before; net sales, $18,687,883, against $22,104,523.

Armstrong Rubber Co., West Haven, Conn., and wholly owned subsidiaries. Twenty-four weeks to March 22, 1953: net profit, $750,977, equal to $1.70 a common share, against $816,628, or $2.02 a share, a year earlier; net sales, $27,999,526, against $21,167,023.

For better age-resistance
n natural and synthetic rubber

WITCO SUNOLITE® WAX

SUNOLITE WAX is made in WITCO's Chicago plant.

- ★ Lighter in color than other anti-sunchecking waxes. No adverse effect on white or pastel stocks.
- ★ Equal or superior to other waxes as an inhibitor of static atmospheric and corona cracking. Tests show 3 to 5 parts Sunolite per 100 parts GR-S 100% effective after 18 months' exposure!
- ★ Useful as frosting preventive . . . imparts good flex cracking resistance.
- ★ Melts and disperses readily at mixing temperatures.

Comparison tests show SUNOLITE outstanding for tire sidewalls, wire jacket and insulation, mechanicals, footwear, garden hose, automotive specialties and sundry goods.

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Acushnet Process Co., New Bedford, Mass. For 1952: net profit $390,799, equal to $1.95 a common share, compared with $447,770, or $2.24 a share, in the previous year; net sales, $9,664,983, against $9,507,333.

Allied Chemical & Dye Corp., New York, N. Y. For 1952: consolidated net income, $40,305,400, equal to $4.55 a common share, against $40,548,649, or $4.58 a share, in 1951.

American Wringer Co., Inc., Woonsocket, R. I., and subsidiaries. For 1952: net income, $448,791, against $498,874 in 1951; net sales, $12,924,079, against $10,392,681.

Anaconda Wire & Cable Co., New York, N. Y. Twelve months ended December 31, 1952: net profit, $6,275,922, equal to $7.44 a common share, compared with $5,765,586, or $6.83 a share, a year earlier.

Baldwin-Lima-Hamilton Corp. Philadelphia, Pa. Twelve months to December 31, 1952: net earnings, $7,222,925, equal to $1.51 a share, compared with $4,585,196, or 96¢ a share, a year earlier.

Belden Mfg. Co., Chicago, Ill. Year ended December 31, 1952: net earnings, $975,799, equal to $3.04 a common share, compared with $1,161,576, or $3.62 a share, in the previous 12 months.

Whitney Blake Co., Hamden, Conn. For 1952: net earnings, $451,591, equal to $2.26 a common share, against $517,078, or $2.58 a share, in 1951.

Borg-Warner Corp., Chicago, Ill. For 1952: consolidated net income, $22,914,657, equal to $9.33 a common share, compared with $21,219,389, or $8.83 a share, in 1951.

Boston Woven Hose & Rubber Co., Cambridge, Mass. Six months ended February 28, 1953: net income, $117,342, contrasted with $366,511 for the six months ended February 29, 1952; net sales, $7,748,102, against $9,558,902.

Dewey & Almy Chemical Co., Cambridge, Mass. Initial quarter, 1953: net income, $144,709, equal to 16¢ a common share, contrasted with net loss of $23,529 in the like period last year; sales, $7,243,846, against $5,787,961.

Brown Rubber Co., Inc., Lafayette, Ind. Year ended December 31, 1952: net profit, $862,034, equal to $2.29 a share, against $959,415, or $2.55 a share, in 1951; federal income taxes, $818,941, against $1,091,609; current assets, $2,687,408, current liabilities, $429,463, against $2,610,153 and $804,479, respectively, on December 31, 1951.

Brunswick-Balke-Collender Co., Chicago, Ill. For 1952: net income, $714,662, equal to $1.32 a common share, compared with $1,098,446, or $2.17 a share, in 1951.

Canada Wire & Cable Co., Ltd., Leaside, Ont., Canada. For 1952: net profit, $1,994,062, compared with $2,100,634, in 1951; income tax provision, $2,340,000, against $2,950,000; current assets, $17,229,524, against $16,982,355; current liabilities, $7,898,370, against $7,233,815; inventories, $11,867,309, against $11,128,237.

Collyer Insulated Wire Co., Pawtucket, R. I. For 1952: net income, $1,280,382, equal to $8.53 a common share, compared with $711,813, or $4.75 a share, in 1951.

Columbian Carbon Co., New York, N. Y., and subsidiaries. For 1952: net profit, $4,336,582, equal to $2.69 a share, compared to $5,469,279, or $3.39 a share, in 1951; sales, $47,958,975, against $50,008,607; U. S. and foreign income taxes, $2,650,000, against $5,050,000.

Cooper Tire & Rubber Co., Findlay, O. Twelve months to December 31, 1952: net profit, $322,131, equal to $2.05 a common share, against $329,946, or $2.10 a share, a year earlier.

Crown Cork & Seal Co., Baltimore, Md. For 1952: net income, $862,094, equal to 20¢ a common share, contrasted with $3,614,915, or $2.54 a share, the year before.

Detroit Gasket & Mfg. Co., Detroit, Mich. For 1952: net profit, $997,452, equal to $1.90 a share, compared with $1,251,998, or $2.39 a share, in the previous year.

The Eagle-Picher Co., Cincinnati, O., and domestic subsidiaries. Three months to February 28, 1953: consolidated net profit, $632,698, equal to 64¢ a share, against $692,675, or 70¢ a share, a year earlier; net sales, $23,205,611, against $18,924,419.

Dayton Rubber Co., Dayton, O. Quarter ended January 31, 1952: net earnings $455,657, equal to 74¢ each on 586,767 common shares; net sales, $14,904,533.

DeVilbiss Co., Toledo, O. For 1952: net income, $902,239, equal to $3.01 a share, against $1,025,177, or $3.42 a share, a year earlier.

Diamond Alkali Co., Cleveland, O. First quarter, 1953: net earnings, $1,561,549, equal to 63¢ each on 2,262,503 shares, compared with $1,845,321, or 76¢ a share, a year earlier; net sales, $21,572,915, against $20,501,624.

Dow Chemical Co., Midland, Mich., and subsidiaries. Nine months to February 8, 1953: net profit, $25,269,416, equal to $1.11 a common share, against $25,706,753, or $3.13 a share, a year earlier.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., and subsidiaries. For 1952: net earnings, $224,064,550, equal to $4.70 a common share, against $220,743,811, or $4.64 a share, the year before.

Farrel-Birmingham Co., Inc., Ansonia, Conn., and subsidiary. For 1952: net income, $1,935,655, against $1,937,483 in 1951; net sales, $43,986,659, against $33,770,681; provision for federal taxes, etc., $3,605,000, against $2,600,000; current assets, $19,759,733, current liabilities $9,660,658, against $18,158,448 and $9,040,379, respectively, at the end of 1951.

General Cable Corp., New York, N. Y. For 1952: net income, $5,283,230, equal to $2.38 a common share, against $5,506,949, or $2.48 a share, in 1951.

March quarter, 1953: net profit, $1,405,821, equal to 64¢ a common share, against $1,234,206, or 55¢ a share, in the 1952 quarter.

General Electric Co., Schenectady, N. Y., and subsidiaries. For 1952: net profit, $151,719,905, equal to $5.26 a common share, against $138,116,527, or $4.79 a share, in the preceding year.

General Motors Corp., New York, N. Y., and consolidated subsidiaries. For 1952: net earnings, $558,721,179, equal to $6.25 a common share, compared with $506,199,560, or $5.63 a share, in 1951; net sales, $7,549,154,419 (a record high), against $7,465,554,851.

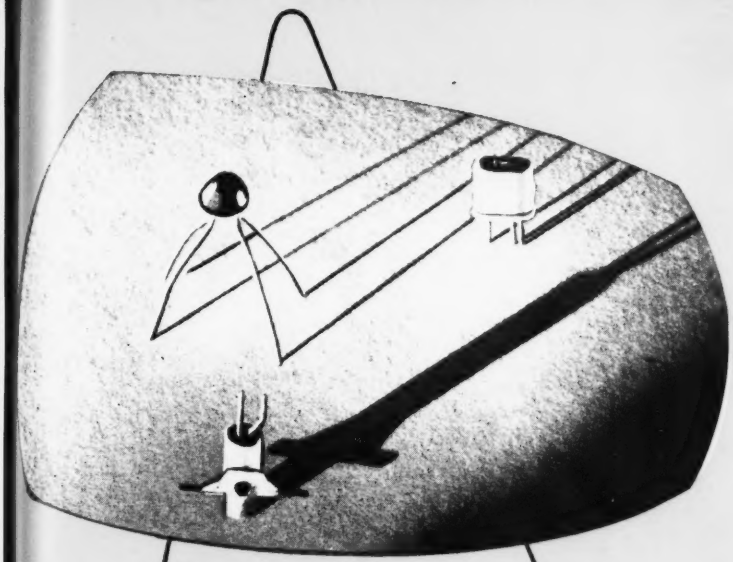
Goodall Rubber Co., Trenton, N. J. For 1952: net earnings, $292,894, equal to $2.56 a common share, contrasted with $420,393, or $4.30 a share, in 1951; net sales, $9,137,493, against $10,686,112.

Hewitt-Robins, Inc., Stamford, Conn., and domestic subsidiaries. For 1952: net income, $1,051,199, equal to $3.67 each on 286,051 shares outstanding, against $1,038,219, or $3.73 each on 278,714 shares, the year before; net sales, $37,364,512 (a record), against $36,307,105; federal income taxes, $1,078,550, against $1,607,304; current assets $15,506,901, current liabilities, $5,191,310, against $13,495,755 and $6,991,130, respectively, on December 31, 1951.

(*Continued on page 278*)

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
Anaconda Wire & Cable Co.	Com.	$0.75	Apr. 21	Apr. 7
Baldwin Rubber Co.	Com.	0.10 extra	Apr. 27	Apr. 15
		0.15 q.	Apr. 27	Apr. 15
Boston Woven Hose & Rubber Co.	Com.	0.20	May 25	May 15
Collins & Aikman Corp.	Com.	0.40	June 1	May 19
Detroit Gasket & Mfg. Co.	Com.	0.25 q.	Apr. 25	Apr. 10
DeVilbiss Co.	Com.	0.30 q.	Apr. 20	Apr. 10
Firestone Tire & Rubber Co.	Com.	0.75 q.	Apr. 20	Apr. 3
General Electric Co.	Com.	0.75	Apr. 25	Mar. 20
Goodall Rubber Co.	Com.	0.15 q.	May 15	May 1
	Pfd.	2.50 s.	May 15	May 1
Goodyear Tire & Rubber Co.	Com.	0.75 q.	June 15	May 15
	Pfd.	1.25 q.	June 15	May 15
Lee Rubber & Tire Corp.	Cap.	0.75 q.	May 1	Apr. 15
		0.50 extra	May 1	Apr. 15
Union Asbestos & Rubber Co.	Com.	0.25	July 1	June 10



IN ELECTRONICS . . .

The transistor is a tiny electronic device that amplifies electric signals 100,000 times. Entirely new in principle, it would take over many jobs of the vacuum tube and do many other things besides. Invented by the Bell Telephone Laboratories, the transistor opens new doors of opportunity in the communications and electronics field.

Setting new standards of **PROGRESS**

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CRUDE RUBBER, SYNTHETIC RUBBER, SCRAP RUBBER, HARD RUBBER DUST, PLASTICS

New Machinery

Liquid Level Controls

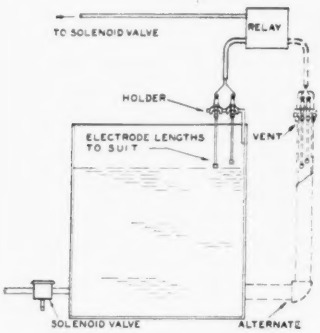


Diagram of Typical Installation of Johnson Tank Controls in Open Tank; Dotted Lines Show Alternate Mounting of Electrode Holder

JOHNSON tank controls, a new approach toward simplifying the problem of controlling liquid levels in tanks, vats, or other vessels, has been announced by Johnson Corp., Three Rivers, Mich. The new system utilizes three proven, standardized components: a Johnson electrode holder, a relay, and a Johnson direct operated solenoid valve.

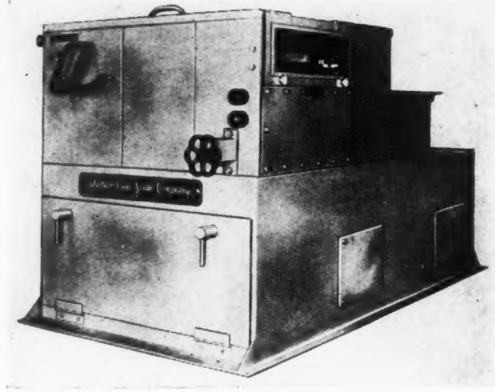
In operation, two stationary electrodes are suspended in the tank where a circuit between them is established or broken by the rising or falling of the liquid level. This circuit actuates the relay which, in turn, operates the solenoid valve. This valve may be installed in either the tank supply or discharge line, according to the specific operating conditions. Components are available in several sizes to meet a wide range of requirements, and the system can be used with liquids of all types.

Continuous Feeder

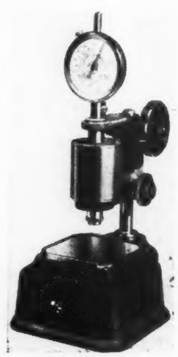
THE Richardson Scale Co., Clifton, N. J., has announced the availability of its new E-20 constant-weight continuous feeder for solid material. The machine is claimed to be capable of handling material at constant weights at rates up to 3,000 pounds a minute, with a variance in weight during any two-minute period of less than 1%.

From the inlet opening, a conveyor belt is used to carry the feed beneath a depth-controlling regulator gate with a sharp or involute edge, over a scale mechanism that automatically controls the height of the gate, and out a discharge opening at the bottom of the feeder. Dusttight housing of the electrical equipment and a recording device are also contained on the new machine.

The feeder comes in two models with stream widths of nine and 18 inches for handling rates of 75-1,500 and 150-3,000 pounds a minute, respectively.



Richardson's E-20 Constant-Weight Continuous Feeder



Wallace Dead-Load Hardness Tester

Wallace Hardness Meter

Wallace Hardness Testers

ALTHOUGH the hardness testing instruments made by H. W. Wallace & Co., Ltd., Croydon, Surrey, England, have been in use in England and Europe for several years, they are relatively new as far as the United States is concerned.

Two instruments are available: one is the Wallace dead-load hardness tester, which is a precision instrument measuring to laboratory standards of accuracy; and the other, the Wallace hardness meter, a hand-applied instrument similar in size and type to the Shore durometer.

The Wallace dead-load hardness tester applies the load to the indentor by means of weights instead of a spring. Readings are taken from a sensitive dial gage of standard design, with scale readings in units of the Hardness Scale of the International Standards Organization (ISO/TC/45). It is said that one degree on this scale can be proved mathematically to represent approx-

(*Continued on page 256*)

Adamson United maintains gage uniformity by using TIMKEN® bearings on roll necks

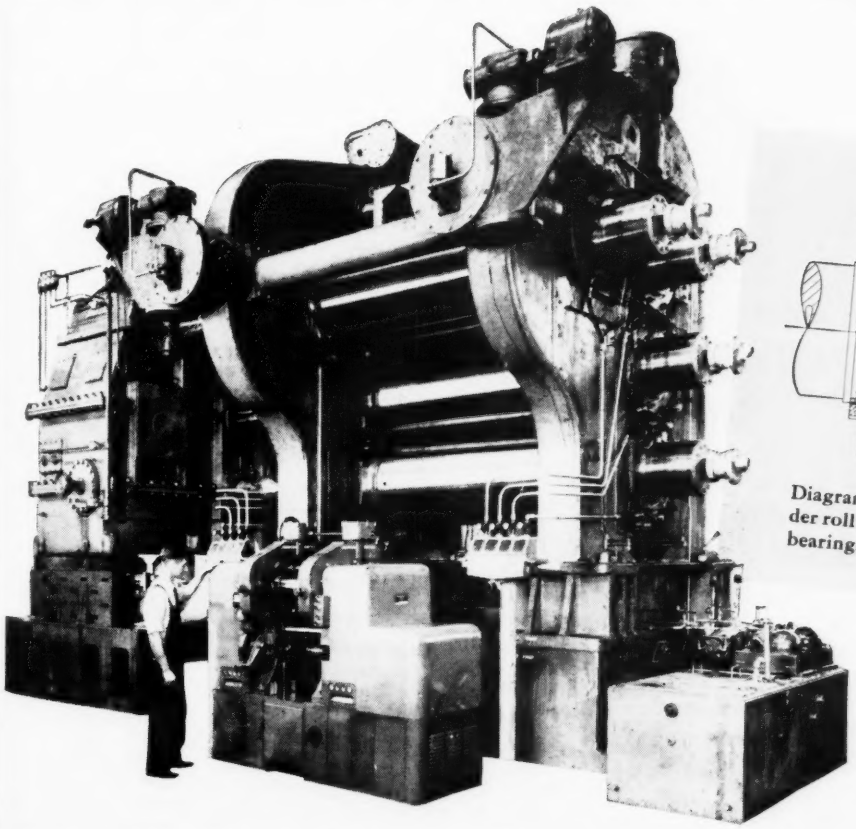
THE rolls of the Adamson United 36″ x 92″ and 8″ x 16″ 4-roll calenders shown below are mounted on Timken® tapered roller bearings. As a result, accurate gage of plastic film is maintained longer than is possible with sleeve type bearings. Rolls stay in accurate alignment maintaining uniform gage the length of the sheet.

By eliminating friction between roll neck and bearing, Timken bearings eliminate roll neck wear. The calender maintains precision with fewer overhauls, and downtime is reduced because roll necks don't require regrinding. Wear within the Timken bearings themselves is negligible because of their true rolling motion and smooth surface finish of rollers and races.

The gear stand driving the larger calender is also equipped with Timken bearings—a total of 19.

Tapered construction of Timken bearings permits them to take both radial and thrust loads in any combination. Due to line contact between rollers and races, Timken bearings have load capacity to spare. Get the advantages of Timken bearings in your calenders, mills, refiners, and mixers. For full information, write The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



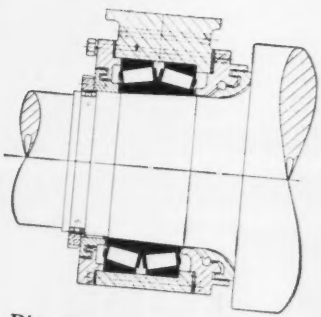
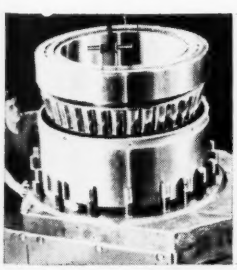


Diagram shows typical calender roll application of Timken bearings.



ROLL NECK BEARING ENGINEERING SERVICE

Our field and service engineers have had years of experience with problems of roll neck bearing design and operation. They'll help you select bearings and design mountings. The Timken Roller Bearing Company is the acknowledged leader in: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. special analysis Timken steels.

TIMKEN

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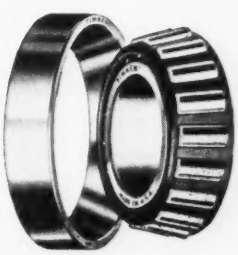
TAPERED ROLLER BEARINGS



NOT JUST A BALL ◯ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▱ BEARING TAKES RADIAL ▯ AND THRUST ↔ LOADS OR ANY COMBINATION

New Materials

Chemical Blowing Agent—BL-353

A NITROGEN releasing, chemical blowing agent, called BL-353, has been introduced in an experimental capacity by E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., for use in the manufacture of sponges. The new material may be employed in open and pressurized molding processes, although the company specially recommends its use in the former method of expanding plastisols. Polyvinyl chloride compounds, vinyl copolymers, and rubber-plastic blends have performed satisfactorily with the blowing agent in pressurized molds; in open molds, however, only three types of PVC compounds have been used successfully.

Composed of 70% active ingredient and 30% mineral oil diluent to desensitize the active material to impact and friction, BL-353 is said to decompose smoothly and rapidly on heating without requiring the presence of activators. Safe storage at temperatures up to 100° F. is reported, and stability, when the material is heated independently up to 220° F. is claimed although the temperature of decomposition is markedly affected by various diluents of the active ingredient.

The new material can be dispersed by vigorous mechanical stirring or by blending in a paint mill or on a three-roll mill. To minimize decomposition on the rolls, the milling temperature should not exceed 120° F. Use of BL-353 present safety problems due to its characteristics of extremely easy ignition and very rapid burning rate.

Estanox Fatty Ester Plasticizers

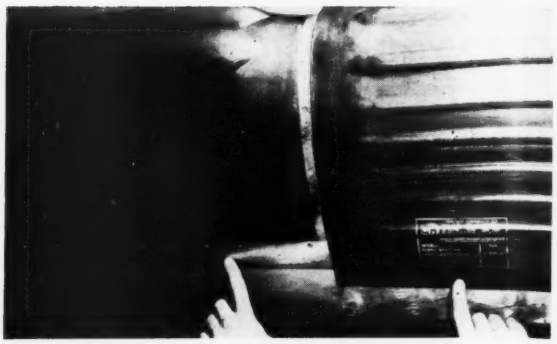
TWO new plasticizers, Estanox 203 (butyl hydroxy-acetoxy ester) and Estanox 206 (butyl poly-acetoxy ester), have been introduced to the plastics field by Baker Castor Oil Co., New York, N. Y. Both materials are synthetic hydroxylated fats made by a modification of the peracetic acid process for hydroxylation.

When used with vinyl resins, Estanox 206 is stated to be a highly efficient, low-cost secondary plasticizer, and Estanox 203 is called a stabilizing plasticizer. Both esters are primary plasticizers for cellulosic resins and synthetic rubbers.

Advantages claimed for these materials are, in addition to reasonably low cost, increased compatibility with PVC resins, lower volatility, greater resistance to ultra-violet exposure, stability to oxidation, and freedom from rancidity.

"GR-S & GR-I Synthetic Rubbers." Reconstruction Finance Corp., Office of Synthetic Rubber, Sales Division, Washington 25, D. C. 68 pages. This hard-covered loose-leaf binder presents up-to-date indexed information on the various types of GR-S and GR-I polymers and latices. Data sheets for individual polymers provide characteristics, physical properties, and applications; while general information is presented as introductory material.

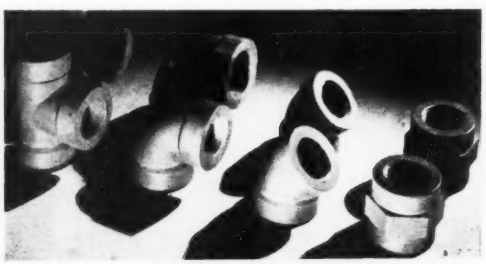
New Goods



Inflated Display Models of Old (*Left*) and New Goodrich De-Icers

Pneumatic De-Icers

THE B. F. Goodrich Co., Akron, O., has improved its de-icer for removing ice formations from commercial aircraft. The new de-icer consists of a network of small inflatable rubber tubes made of rubberized nylon high-stretch fabric embedded in thin panels of rubber. These panels are cemented to the leading edges of a plane and are electronically controlled to expand automatically to crack off ice. The new tubes are only one-third the size of those used in the older model, but can withstand three times the inflation pressure. The new de-icer assembly is said to offer the advantages of less air resistance in flight while decreasing the inflation-deflation cycle time by two-thirds.



Boltaron Rigid Vinyl Pipe Fittings

Rigid Vinyl Pipe Fittings

THE development of threaded I.P.S. pipe fittings molded of rigid, n n-plasticized Boltaron 6200 polyvinyl chloride, a product of Bolta Products, Inc., has been announced by H. N. Hartwell & Son, Inc., Boston, Mass., exclusive distributor of

★ ★ ★ PLASTICIZER NEWS ★ ★ ★

INCREASED AVAILABILITY

Widens Use Of Plastolein Plasticizers as Primary, Basic Types

The completion of Emery's revolutionary ozone-oxidation plant in several months will increase the availability and improve the economic position of Plastolein Plasticizers to the point where they can be used more widely as primary plasticizers.

This particularly applies to Plastolein 9720 Polymeric. Greater availability at present economic levels, together with its proven performance, make this product particularly appealing as a primary plasticizer. Not only does it have all the requisites of a basic plasticizer, but its permanence in terms of resistance to water and oil, and low volatility, is superior to most primary-type plasticizers. In addition, 9720 is extremely stable to both heat and light, does not deteriorate or cause brittleness upon aging, and has the efficiency common to most monomeric types.

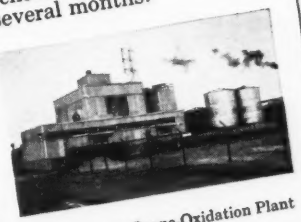
Proven Performance

Plastolein 9058 DOZ (di-2-ethylhexyl azelate) also has the performance requirements of a primary plasticizer. Now, because of new processing methods, such as the ozone-oxidation process, the economic picture is improving rapidly. This, coupled with greater availability and proven performance of Plastolein 9058 will lead to its wide selection as a primary, basic plasticizer in the not too distant future.

Emery invites all manufacturers who are not already using a Plastolein Plasticizer, to start an evaluation of these two products immediately. Samples and descriptive literature are available on request.

Completion of Plant Building Marks First Major Step Toward Increased Production

The new building which will house Emery's revolutionary ozone-oxidation process has now been completed. Already it contains some of the unique equipment for this operation which is scheduled to go on line in several months.



Emery's New Ozone-Oxidation Plant

Production of Azelaic and Pelargonic Acids, from this plant, will result in increased quantities of those Plastolein Plasticizers which are based on these exclusive, unique saturated acids. Specifically, this involves Plastolein 9050 DHZ (di-2-ethylbutyl azelate), Plastolein 9058 DOZ (di-2-ethylhexyl azelate), Plastolein 9055 DGP (diethylene glycol dipelargonate), Plastolein 9715 and 9720 Polymerics.

The acids themselves are used also in the manufacture of alkyd resins, synthetic lubricants, nylon-type polyamides, soaps, and in the flotation of various minerals. The greater availability of these acids should open up many new avenues of research based on their unique properties.

Plastolein 9057 DIOZ Announced!

Di-iso-octyl azelate Now Available in Commercial Quantities

The addition of Plastolein 9057 DIOZ (di-iso-octyl azelate) to its general line of Monomeric and Resinous Plasticizers has just been announced by Emery.

Similar in performance to di-2-ethylhexyl azelate (Plastolein 9058) Plastolein 9057 is a primary, monomeric plasticizer for all types of vinyls, cellulosics and synthetic rubbers.

In addition to the efficiency, compatibility and permanence that make it a basic, primary plasticizer, Plastolein 9057 imparts excellent low temperature flexibility. It is applicable to vinyl calender sheeting, calender and cast film, calender and dispersion coated fabrics, extruded products and plastisol formulations. Plastolein 9057 also offers efficiency and low temperature properties for nitrile and GR-S rubbers and cellulosics.

MAIL COUPON TODAY for descriptive materials on Emery Plastolein Plasticizers!

EMERY INDUSTRIES, INC., Dept. B-5
Carew Tower, Cincinnati 2, Ohio

Please send me: ☐ Plastolein Plasticizer Booklet
☐ Plastolein 9057 Technical Bulletin

Name..... *Title*.....
Company.....
Address.....
City..... *Zone*..... *State*.....

Emery

Fatty Acids & Derivatives
Plastolein Plasticizers
Twitchell Oils, Emulsifiers

Emery Industries, Inc., Carew Tower, Cincinnati 2, Ohio

EXPORT: 5035 RCA Bldg., New York 20, New York
New York • Philadelphia • Lowell, Mass. • Chicago • San Francisco
Warehouse stocks also in St. Louis, Buffalo, Baltimore and Los Angeles

this material. The plastic fittings are available in the form of tees, 45- and 90-degree elbows, and couplings, and in sizes to fit ¼-2-inch pipe. The fittings are carried in stock for use with Boltaron pipe in overcoming corrosion problems. Pipe in sizes to match is available in 10- and 20-foot lengths and can be threaded with standard pipe dies. Boltaron 6200 is said to provide outstanding resistance to inorganic and organic acids, alkalies, alcohols, and foodstuffs, as well as to provide hardness, toughness, and rigidity.

Truck Tire

Super All Traction Heavy-Duty Truck Tire

A NEW truck tire, designed primarily for use where mud, snow, and ice conditions are severe, has been announced by Firestone Tire & Rubber Co., Akron, O. Called the Super All Traction, the tire is designed as a supplement to the All Traction truck tire where extra traction is desired. The body of the tire is constructed of gum-tipped tension-dried rayon cord, and the treads are wider and flatter to provide greater strength, smaller stretching, and increased gripping action. The tire is available in sizes up to and including 8.25-20.

Hardness Testers

(*Continued from page 250*)

imately the same proportionate difference in Youngs' modulus for substantially elastic isotropic materials such as well-vulcanized rubber. An electric vibrator is built into the base to overcome friction and sticking.

The Wallace dead-load hardness tester conforms to the new method of test recommended by ISO/TC/45, which is at present being studied by subcommittee 17 of Committee D-11 of the American Society for Testing Materials. It is possible to relate readings with this instrument to the Shore scale over a considerable part of the range.

The Wallace hardness meter is similar in size and type to the Shore durometer. The load on the indentor is spring applied, but is virtually constant throughout the range of travel of the indentor, and this condition is achieved by using a considerable length of spring steel in the form of a coil. A weight is supplied with each instrument which is used to test indentor pressure. An important feature of the hardness meter is that the indentor pressure is constant.

Both instruments and a new plasticity tester by the Wallace company will be demonstrated in Toronto, Canada, June 1-12, at the Canadian International Trade Fair by Charles Churchill (Canada), Ltd.

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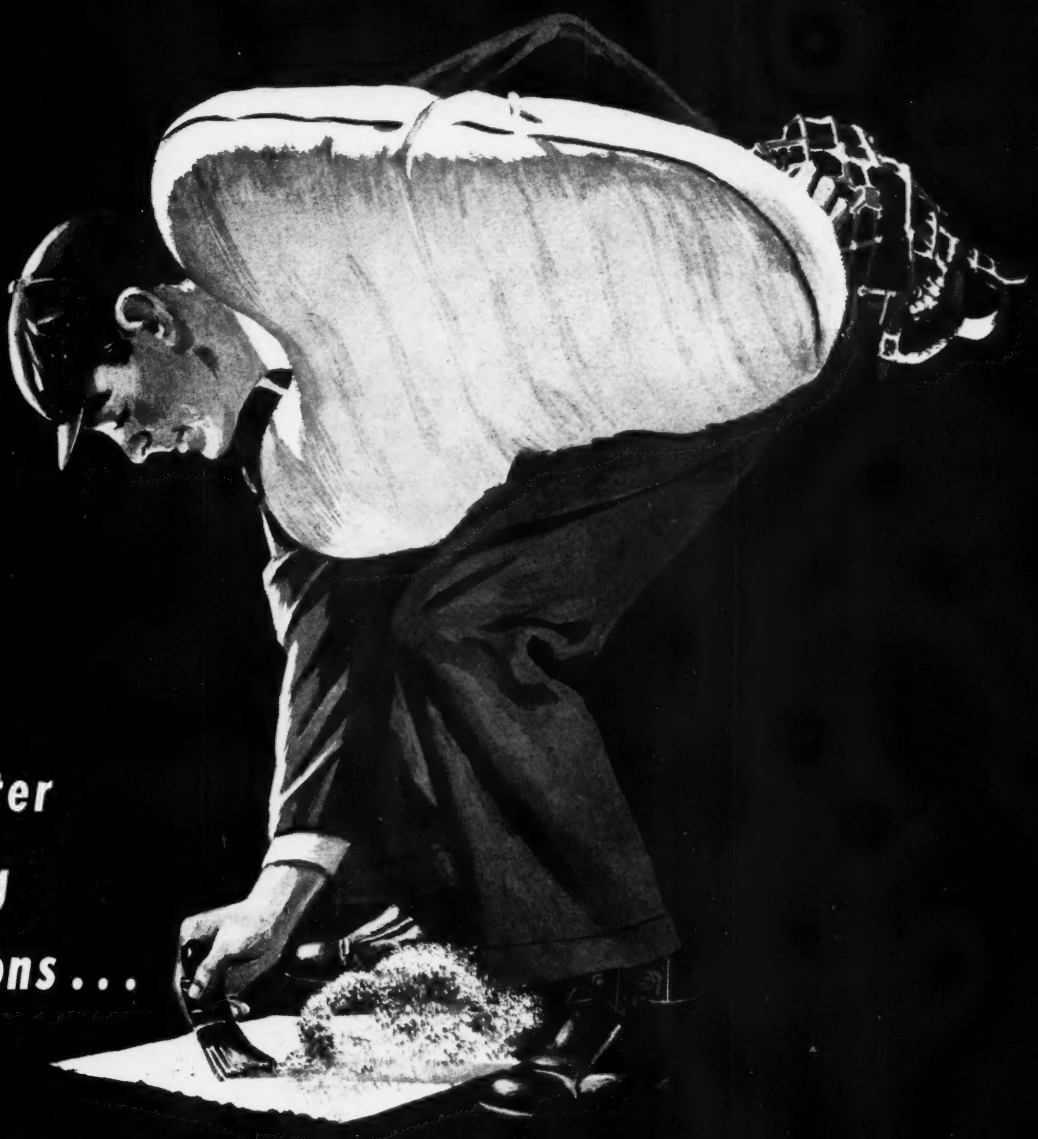

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INTERMEDIATE & RUBBER CHEMICALS DEPARTMENT

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Calco MBTS scores high in low dusting!

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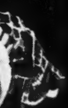
see reverse side



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FAR EAST

MALAYA

Rubber Trade Falling Off

Sharp reductions in imports of rubber from Indonesia during February and March is seriously affecting Singapore's economy; not only has it lost business from the handling and shipping of readily marketable rubber, but its remilling industry, which depends mainly on Indonesia for supplies of wet and scrap rubber, has been particularly hard hit.

According to available information, there are 11 Chinese and two European remilling factories in Singapore; in addition two other plants—one of Japanese origin—operate spasmodically. The drop in imports has forced half the Chinese firms to close down; while others are working on reduced schedules. Activity in 1952 already declined considerably as compared with 1951, imports of wet and scrap rubber for processing and reexportation having reportedly amounted to 105,000 tons, against 172,000 tons. Total imports had fallen off in 1952, as against 1951, and the drop continued into the first months of 1953. However, while January, 1953, arrivals at 30,696 tons were not too far below the January, 1952, imports, those for February, 1953, amounted to only 13,804 tons—the lowest since February, 1946, when 9,648 tons arrived—and of the 1953 figure, only 3,338 tons was Indonesian wet slab. Since several thousand laborers and their families depend on this industry for a living, considerable unemployment and distress are likely to result.

While Singapore mills are thus starving for rubber, large quantities of the very grades required are piling up at the ports of Djambi and Palembang, in Sumatra; the amount is variously estimated at 60,000 tons and all the way up to 100,000-125,000 tons.

Many reasons have been suggested for this situation: rumors of possible further devaluation of the rupiah have caused shippers to hold off; the low price of rubber and a falling market, combined with a sliding scale of export duty, discourage the exporter in Indonesia; shippers are keeping back supplies for direct export to Japan or the United States; the ban on shipments of rubber on consignment which the Indonesian Government put into effect as from January 1, 1953; wet slabs and unsmoked rubber were not exported so as to make larger supplies available for local remillers. Whatever the reason, the result is the same: reduction of trade in Singapore, that is likely to become worse if the situation is not changed. Alarmed at this prospect, the Singapore Rubber Trade Association, the organization of Chinese rubber millers, packers, and importers, is attempting through the Chinese Chamber of Commerce to obtain government intervention.

As regards the ban on rubber shipments by the Indonesian Government, it was reported from Singapore late in March, that this had been removed as far as RSS-3, RSS-4, and RSS-5 were concerned. But licenses for the export of slab rubber on consignment are still refused.

Malayan rubber trade is suffering losses due to other causes in which Indonesia is also involved. The latter republic has been replacing Malaya as Japan's main source of rubber, and Japanese rubber importers reportedly foresee no immediate change in the situation, which has come about first by Japan's policy of encouraging rubber purchases from Indonesia, and

next by her stopping imports from the sterling area, including Malaya, for a week in February to conserve sterling exchange. The latter step started a rush for open account allocation to buy Indonesian rubber. A further reason is that Japan has been able to make arrangements for selling very large amounts of Japanese goods to Indonesia, and it follows that Japan would reciprocate with increased rubber purchases.

Packers' Worries

A statement by the American Rubber Trade Association that the proposed Malayan claims' endorsement procedure would be irksome to American dealers because shipments are negotiated in many small lots has not tended to allay the suspicions of Malayan rubber packers that some American dealers might continue to try to victimize them. The proposed claims' endorsement procedure would require rubber goods manufacturers (the ultimate consumers) to endorse all claims against packers. At a Rubber Export Registration Board meeting in Malaya in early March, these suspicions were voiced by several members who roundly declared that the claims' endorsement procedure was a necessary protection against unfair, fictitious claims, and that if this procedure were not instituted, it would put the packers at the mercy of the American dealers.

Packers reportedly add that, since certificates of quality are given for every 25 tons of rubber to be shipped, and as 25 tons is the smallest lot a manufacturer will accept, the claims' endorsement procedure should cause no difficulty to American dealers.

It is also learned that rubber shippers here are not in favor of smaller bales. A reduction in the present size of bales would involve increased handling, wrapping, and coating charges, and changes in baling equipment, and thereby raise costs sufficiently to warrant a premium over the Singapore market price. There seemed to be little evidence that consumers would want to bear the extra cost, it was pointed out.

Tax Woes

At the annual meeting of the Malayan Rubber Producers' Council, March 27, the chairman, Khoo Teik Ee, demanded an immediate review of the government's rubber taxation policy, which bore no relation to the realities of the industry. Before the sliding scale was imposed, he said, the rate was 2½%, later raised to 5% on the f.o.b. price. At the prevailing f.o.b. price of 72-75 cents a pound, the rate was 6.75 to 7.17%. In practice it was much higher, as all rubber exported is not No. 1 RSS. Furthermore, 1.75 cents a pound is deducted by local dealers for various charges on storage, insurance, handling, etc. Besides, he added, natural rubber was facing unfair competition from American synthetic, and the export duty was a handicap on the local industry in its efforts to meet that competition, which must become keener because of the expanded research program of the synthetic rubber industry. In short, the heavy taxes were threatening the economy of the country.

Meanwhile the Federal Legislative Council has approved an increase in the rubber cess imposed to finance the Rubber Research Institute of Malaya and new developments. The new rate, effective March 2, is half a cent (S.S. currency) a pound; the old rate was 0.4-cent a pound. The cess had been 0.4-cent in June, 1950; this was reduced to 0.35 in January, 1951, and brought back to 0.4-cent in January, 1952.

White Moldings Prove DOW CORNING Release Agents Keep Molds CLEAN

. . . and cut mold maintenance costs by as much as 80%

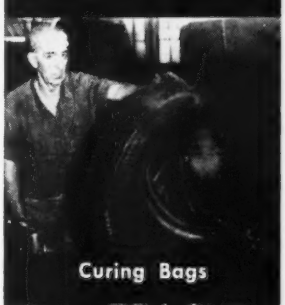
Inspector Mike used to fill the scrap bins when white or light-colored parts were running. But Moe Muscles has put an end to all that with Dow Corning silicone release agents. Brilliantly clean and free from surface blemishes, even white parts leave the mold unstained by carbonized lubricants or mold dirt.

That's because Dow Corning silicone mold lubricants can't break down to form a carbonaceous deposit on mold surfaces. Molds stay clean 5 to 20 times longer than they do with ordinary release agents. Sharp detail, closer tolerances and high surface finish are assured — even on heavily loaded stocks. And mold maintenance costs are reduced by as much as 80%.

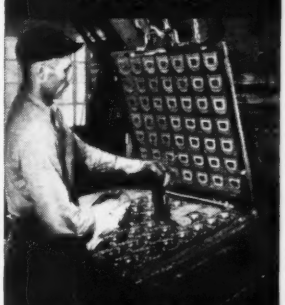
For easier release, lower production costs, improved quality and better appearance, specify Dow Corning silicone release agents: fluid for green carcass, bead and parting line release; emulsions for molds, mandrels and curing bags.

For lower costs specify DOW CORNING SILICONE RELEASE AGENTS

Deep Cavity Molds



Curing Bags



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On an estimated output for 1953 of 525,000 tons, the new cess is expected to yield about $5,880,000 (Straits currency) this year; this figure compares with $7,279,408 in 1950, $4,686,246 in 1951, and $5,061,575 (provisional estimate) in 1952.

Other Rubber Trade News

Anglo-Malay Rubber Co., Ltd., and Bikam Rubber Estate, Ltd., recently merged with Pataling Rubber Estates, Ltd. The new concern, which will operate under the Pataling name, has more than 24,376 acres of planted rubber and 146 acres of oil palm, and liquid assets exceeding £750,000.

An order by the Singapore Government, effective March 31, 1953, requires all British vessels bound for ports in Communist China or North Korea to obtain licenses in London or Singapore. The new ruling, the result of discussions in Washington, D. C., U. S. A., between Anthony Eden, British Foreign Secretary, and John Foster Dulles, seeks to prevent such evasions of existing regulations, as picking up strategic cargoes in non-British ports and diversion at sea to China or Korea.

The Federation of Rubber Trades Associations of Malaya has accepted an invitation from the Crude Rubber Committee of the Rubber Trade Association and The Rubber Manufacturers Association, Inc. (both in the United States), to an international meeting at which problems relating to rubber deliveries will be discussed. A committee representing Malayan producing, packing, and shipping interests will be chosen.

The Federal Government proposes to start new rubber road tests involving the laying of half-mile stretches of rubber-bitumen roads in all the states of the Federation. If successful, airstrips and certain roads will be surfaced with the new material. A special research laboratory, with $10,000 worth of equipment, is to be set up to investigate materials.

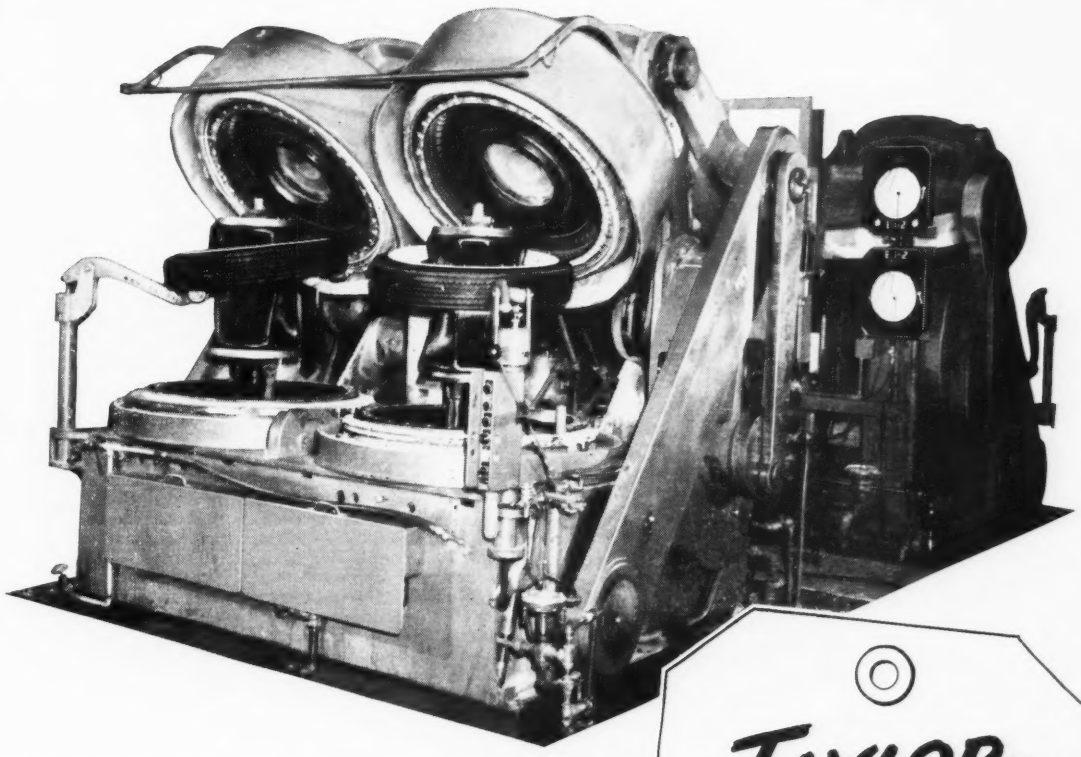
At the same time we learn that a stir was created when it became known that a few weeks before the above plans were announced, a state engineer had told a meeting of the Selangor State Council that experiments so far had shown no special advantage in the use of rubber-bitumen roads in tropical climates. The Malayan Rubber Producers' Council protested to the government on the harmful effect of this statement and demanded strong action against the engineer.

INDONESIA

The rumors regarding a rubber-rice deal between Indonesia and Red China, which continued to agitate the Singapore market practically through February, have finally been put to rest, it seems, by a denial of such an arrangement stemming from an authoritative source in Djakarta.

According to figures supplied by the Secretariat of the International Rubber Study Group, Indonesia's total exports of rubber in 1952 came to 729,936 tons, of which 281,332 tons came from estates and the remaining 448,604 tons from smallholdings.

New Bag-O-Matic Press
saves space and time



THE NEW McNeil Bag-O-Matic Press combines these complicated operations into one simple process by: **(1)** automatically controlling time and temperature during curing **(2)** automatically "bagging" before vulcanizing and "debagging" after vulcanizing **(3)** and automatically opening the press. When delivered "Taylor-Equipped", as most of them are, they are masterminded by a Taylor FLEX-O-TIMER* Time Cycle Controller, two Taylor Double Duty FULSCOPE* Recording Controllers, and a Taylor Pressure Recorder.

FLEX-O-TIMER (*on back side*) automatically controls sequence and duration of all functions from closing to opening of press. Double Duty FULSCOPE Controllers (*right*) control press temperature and condensate removal in each cavity. Taylor Bi-Record Pressure Gage (*right, below*) records bag pressure to each press.

Whatever product you want to make, Taylor can control your process at low cost. To keep quality up and costs down, ask your Taylor Field Engineer! Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada.

Instruments for indicating, recording and controlling temperature, pressure, flow, liquid level, speed, density, load and humidity.

*Registered Trade-Mark

TAYLOR INSTRUMENTS MEAN ACCURACY FIRST

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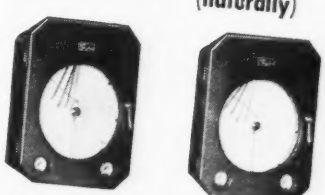
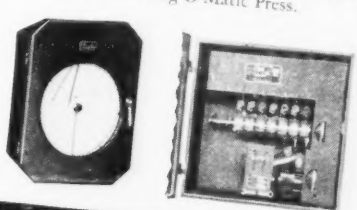
(naturally)



Two Taylor Double Duty FULSCOPE Recording Controllers (*above*) and Taylor Bi-Record Pressure Gage and Flex-O-Timer Time Cycle Controller (*below*) standard-equipped on the new McNeil Bag-O-Matic Press.



Production in 1952 totaled 738,000 long tons, of which about 448,500 tons were from smallholdings and 289,500 tons from estates. These figures compare with a total of 805,250 tons in 1951, when smallholdings yielded 592,000 tons and estates 213,250 tons. It is further reported that in November, 1952, 698 estates were being exploited in Indonesia, of which 683 were in production. Most of the estates (434, of which 424 were in production) were in Java; but the largest (236, with 232 producing) were in Sumatra. Of the remainder, 20, all producing, were in Borneo, and eight, with seven producing, were in other parts of Indonesia. During the first 11 months of 1952, 4,593 tons of rubber were consumed by local rubber factories.

A Central Small Holders' Rubber Board has been established to improve smallholdings and to increase their production. The Board will be financed by surtaxes and export taxes on smallholders' rubber. The Rubber Institute is reportedly constructing five rubber mills in Sumatra, which are expected to be ready shortly.

JAPAN

A Synthetic Rubber Manufacturing Project Committee has recently been set up in Tokyo to study plans for establishing a synthetic rubber plant in Japan capable of producing 36,000 tons of rubber from butadiene (to be obtained from alcohol from sweet potatoes) and styrene. To further the project an 11-man mission, representing the Committee, arrived in the United States in March to spend about two months in investigating technical and construction phases of the industry.

The mission included the following: Benzaburo Kato and Kyoichi Kawasaki, president and chief of the technical division, respectively, of Kyowa Fermentation Industry Co., Ltd.; Sakae Kitagawa and Osamu Takagi, chief of plant division and staff official of instruments division, respectively of Hitachi, Ltd.; Toshio Yamaguchi, vice chief of Loan Department Industrial Bank of Japan, Ltd.; Teruo Kawaguchi, chief of chemical division, Bridgestone Tire Co., Ltd.; Takeo Kubota, vice chief of research division, Yokohama Rubber Co., Ltd.; K. Kikuchi, chief of technical department of Nikka Rubber Co.; F. Fujita, director Toyo Rubber Co.; S. Katsumoto, chief of managing department, Rubber Industry Association; Ikkan Kawase, president, Industrial Textiles Co., Ltd.

They traveled in two groups, one of which visited Chicago, New York, Washington, and Chicago; and the other, only New York, Washington, and Akron.

EUROPE

GERMANY

Plans for the Synthetic Rubber Industry

In anticipation of the day when Germany will regain her sovereignty, and there are no longer restrictions on the production of synthetic rubber, plans for the future of the industry are being widely discussed.

Recently Paul Baumann, head of the Huls Chemical Works, gave his views on the subject.[1] Studies carried out independently in Italy and Germany agree in the conclusion that under the conditions ruling in Western Europe, the minimum output that could be profitably undertaken would have to be between 20,000 and 30,000 tons annually. It would not be practical, however, for every country in Western Europe to start making its own synthetic rubber, Baumann points out; if Germany could count on supplying the needs of some of the neighboring countries, she could aim at an annual production of around 30,000 tons. Besides Germany, Italy and France also have ideas for a domestic synthetic rubber industry, and Baumann, visualizing what would happen if all three decided to produce the same special rubbers for which there is only a limited demand, suggests well-planned cooperation between the parties involved so that one factory only would produce the special rubbers and make supplies available to the other two at favorable prices.

[1] *Kautschuk u. Gummi*, 6, 2, 25 (1953).

The most suitable process for Germany, he goes on, would utilize butane; investigation at Huls has shown that butane can be economically produced here by employing methods developed by the Houdry Process Co., which, he adds, Huls has learned it can acquire. An installation to produce 25,000 to 30,000 tons of synthetic rubber based on butane would require an investment of 45,000,000 to 50,000,000 marks; the output would include butadiene for the manufacture of Buna X at Leverkusen.

Before I. G. Farbenindustrie was broken up, such an investment would have caused no special difficulty. Today, with Huls standing alone, the project could only be financed by an organization composed of the manufacturers of the synthetic rubber (Huls and Leverkusen), the German rubber industry, and the German Federal Republic. Furthermore, Dr. Baumann points out, Huls formerly was mainly occupied with manufacture and relied on the rubber laboratories at Leverkusen for research and developmental work. But now it would have to have its own rubber laboratories and staff, and even if a research department on a level with that at Leverkusen could be speedily achieved, the expense involved would be completely unjustifiable while rubber laboratories at Leverkusen had to remain idle.

Under these circumstances a way would have to be found for the two concerns to collaborate on research and developmental work without violating the decisions relating to the dissolution of the I. G. Farbenwerke. This could be done, Baumann considers, via a brands agreement, which is permitted, since both works use the Buna trade mark, and apparently discussion in this direction has already been started between the firms involved.

The relatively favorable financial position of the Rubber Price Equalization Fund set up last year in aid of synthetic rubber has led the Council to recommend a reduction in the contributions by manufacturers from 20 pfennigs for every kilogram of natural or imported synthetic rubber used to 1 pfennigs.

Industry Briefs

Continental Gummi-Werke A.G., Hannover, is now offering various mechanical goods made of Vulkollan, the new German synthetic product, including friction wheels, gears (cogged wheels), diaphragms, gaskets, joints, piston rings, and press plates.

On October 31, 1952, the foundation stone was laid at Frankfurt a.M., of the first European research center of the Batelle Memorial Institute. The Batelle Memorial Institute for Germany is to be under the direction of Robert R. Adams and is to have an almost exclusively German staff. Scholarships to a value of about 200,000 marks annually will be made available for carrying out 50 projects in the most diverse fields of industrial research. Part of the building was expected to be ready for use this spring.

Experiments are being conducted in the use of foamed plastic dressings to take the place of plaster casts and similar rigid dressings, in the treatment of fractures. Dressings of foamed PVC, polystyrene, and polyurethane are said to have several advantages: they have only a fraction of the weight of the usual dressings; they permit respiration of the skin and are flexible. They can easily be molded to conform to the part being treated by heating; and since they allow X-rays to penetrate freely, fractures can be set and observed without the need of disturbing or changing the dressing.

A device for measuring the thickness of films, and apparently similar to American instruments of the same type, which has been developed at the Laboratorium Prof. Dr. Berthold, Wildbad,

utilizes the beta radiations of radium. The beta rays in a measuring preparation act through the sample on to a measuring chamber arranged below it, in which an ionization current is generated. An amplifier for the ionization current is connected by cables with the main amplifier in an indicator device. The new apparatus is said to be highly sensitive.

German Rubber Association Expanding

A recent communication of the German Rubber Association gives details of the sessions of three newly established district groups. The Hamburg & Schleswig-Holstein branch, under the provisional management of W. Stegemann, a director of Phoenix Gummiwerke A.G., held its first meeting in Hamburg on December 12, 1952. W. Scheele presented two papers: "The Development of the Chemistry of the Polyamids and Polyurethanes to the Highly Elastic Vulkollan" and "Conductometric Titration of Vulcanization Accelerators and Rubber Compounding Ingredients."

The Niedersachsen Group was formed at a meeting held October 28, 1952, when H. Bickel, chief chemist of Continental Gummiwerke A.G., was unanimously elected group director. The assembly heard Dr. Brunger speak on "Dispersion of Fillers in Synthetic Rubber."

The South German Group, under its provisional head, D. Schmidt, held its first meeting on November 22, 1952, when C. Prael dealt with questions pertaining to the encouragement and training of young chemists and technologists for the rubber industry.

FRANCE

As its name implies, the recently formed Association for Studying Butyl Rubber is to devote itself to the problems of manufacturing this synthetic rubber in France. The members of the group, drawn from the chemical, rubber, and petroleum industries, include: Bozel Malétra, Ugine, Etablissments Kuhlmann, Pechiney, Rhone-Poulenc, Michelin, Dunlop, Kleber Colombes, Cie. Francaise de Raffinage, and Esso Standard. It is intended eventually to form a company to set up and run a factory for butyl rubber and undertake its sale.

Revue Générale du Caoutchouc entered the thirtieth year of its existence with the issue of January, 1953. Started in 1924 by the Syndicat National du Caoutchouc, the periodical successfully struggled through the depression and the war.

GREAT BRITAIN

Production of synthetic rubber in Scotland is being considered by the Scottish Council (Development and Industry). There have been discussions with interested firms, including Dunlop Rubber Co., Ltd., it is reported.

Hess Products, Ltd., 4 Albion St., Leeds 1, manufacturer of Distec fractionally distilled fatty acids, through sales Manager A. K. H. Fletcher, has reported that the recent fire at its Littleborough works has not caused as much damage as was originally feared, and the plant once more is in full production.

Editor's Book Table

BOOK REVIEWS

"Pneumatic Tire Design." E. C. Woods. Published by W. Heffer & Sons, Ltd., Cambridge, England, for the Institution of the Rubber Industry, Ltd., 12 Whitehall, London S.W. 1, England. Cloth, 6 by 8½ inches, 101 pages. Price 21s.

The author has compressed into relatively few pages a surprisingly varied coverage of tire designers' practices. While none of the material can be considered new or enlightening to the experienced technologist in this field, the beginner will find it a worthwhile portrayal of the more important factors in this extremely complex field.

Of the seven chapters, the first two present a brief survey of the history of pneumatic tires and discuss the various types of tires and tread designs. The third chapter, entitled "Mold Design," covers the subject well, but also includes much that is not mold design at all.

The next chapter deals with "Cord Angle and Construction Details," but in somewhat erratic fashion. This whole subject is admittedly deep going, which fact may explain why some inconsistencies and even inaccuracies have remained. For example, the contourwise component of carcass strength is correctly given, but the statement follows that the circumferential component is not used because it does not yield to elementary treatment. It would seem that here a good opportunity is missed to define cord tension and its usefulness and relation to tire performance. Again, the equation given for bead tension is more nearly the total tension across the section of a tire, part of which is carried by the cords themselves. It is implied that there is difficulty in computing the actual bead tension, but the equation is allowed to stand in incorrect form.

Methods and practices of drawing and laying out the details of the bead structure and ply endings, breakers, sidewall, and tread are carefully described in the fifth chapter. This information is supplemented in the following chapter and the first appendix by methods of computing ply and building drum dimensions. One such method is partially described, then dismissed as being inaccurate and tedious to use. In our opinion, this method is quite reliable and easily and quickly applied and well deserves the first-class recognition given it by Hadekal's review of tire literature. The concluding chapter covers building specifications.

This handbook, as it may quite properly be designated, is adequately illustrated throughout by clear and well chosen diagrams and charts, although many of the illustrations are unnecessarily large in size. All features considered, this monograph can be recommended as a useful addition to the library of anyone connected with the technical aspects of the tire industry.

R. D. Evans[1]

[1] Manager of tire design research, Goodyear Tire & Rubber Co., Akron, O.

"Selected Government Research Reports. Volume I. Plastics." Issued by the British Ministry of Supply and published by Her Majesty's Stationery Office. American sales agents: British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. Cloth, 6 by 9½ inches, 446 pages. Price, $8.

This volume is a compilation of 21 reports selected from research work on plastics carried out under the direction of the British Ministries of Supply and Aircraft Production, now combined as the Ministry of Supply. The reports, prepared by both government, industrial, and university laboratories, were compiled by the Technical Information and Documents Unit of the Department of Scientific and Industrial Research. The reports are comprehensive in nature and contain a good deal of previously unpublished information, but use of the book as a reference is handicapped by the lack of a subject index.

Titles of the reports are as follows: "Mechanical Properties of High Polymers"; "The System Polymer/Plasticizer"; "Plasticizer/Polymer Interaction"; "Notes on the Sorption of Water by High Polymeric Materials"; "Linear Shrinkage of Phenolic Moldings During Post-Curing Stoving"; "Use of Flax Shives in Phenol-Formaldehyde Molding Powders"; "Effect of Fillers and Other Additions on the Elastic Modulus in Compression and on the Swelling of a Phenol-Formaldehyde Resin"; "Investigation Into the Setting Process of Phenol-Formaldehyde Resins"; "Note on the Ductility of Plastic Materials"; "Effect of Atmospheric Humidity on the Strength and Dimensions of Thermoplastics"; "Correction of the Indicated Impact Value of Brittle Plastics"; "Strength Tests of a Number of Similar

Small Moldings in Phenol-Formaldehyde Synthetic Resin Molding Materials"; "Use of Reinforced Plastic Material in Aircraft Construction"; "Direction Strength and Stiffness of Fibrous Materials"; "Some Factors Influencing the Properties of Paper-Reinforced Synthetic Resin Sheet"; "Microscopic Examination of Reinforced Synthetic Resins"; "Strength of Bolted Joints in 'Perspex'"; "Quantitative Method for Comparing 'Perspex' Polishes"; "Synthetic Resin Glues (1) The Influence of pH on the Rate of Hardening of Cold-Setting Glues," and (2) "Setting Time/pH Characteristics of Cold-Setting Resins Prepared From Some Monohydric Phenols"; and "Chemical Factors Involved in the Gluing of Wood With Cold-Setting Urea-Formaldehyde Resins—Failing Load of Gap Joints."

NEW PUBLICATIONS

Publications of B. F. Goodrich Chemical Co., Rose Bldg., Cleveland 15, O.

"Hycar Polyacrylic Rubber." Service Bulletin H-11. 42 pages. The characteristics of the uncompounded polymer and of typical vulcanizates is discussed, and data on general compounding, processing, specific compounding, and adhesion of the polyacrylic rubber to other materials are detailed in this attractive bulletin.

"Hycar Technical Newsletter." Vol. 2, No. 3. 8 pages. This catalog insert discusses the properties of GR-S compounded with Good-rite Resin 50, describes the use of polyacrylic rubber as a plasticizer for nitrocellulose lacquers, and details data obtained on a variety of curing systems for heat resistant compounds.

"Hycar Latex Newsletter." March, 1953. 5 pages. This letter contains information on latex adhesives, zinc oxide dispersions, and cotton goods impregnated with Hycar latices. In the latter case, methods of reducing the shrinkage of the goods and data thereto pertaining are also given.

"The Prevention of 'Strike-Through' in Neoprene Latex Coated Fabric." BL-250. 3-31-53. E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. 4 pages. The formation of deposits of latex dipping compounds on the reverse side of an object coated with the compound is described. The use of two preventive measures is discussed, and specific data on application are given.

"Carbon Black, 1950." D. S. Colby, H. J. Barton, and B. E. Oppegard. United States Bureau of Mines. For sale by Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. 10 pages. Price, 5¢. This pamphlet contains figures on the production, demand, stocks, prices, foreign trade, and trends of carbon black. Comparison of these data with those of previous years is also made.

"Forty Years of Progress." National Association of Waste Material Dealers, Inc., 271 Madison Ave., New York 16, N. Y. 28 pages. This attractively illustrated booklet which marks the fortieth anniversary of the association describes the highlights in the development of NAWMD and the entire waste materials industry. The activities of the various divisions within the organization, including the Scrap Rubber Institute, are also covered.

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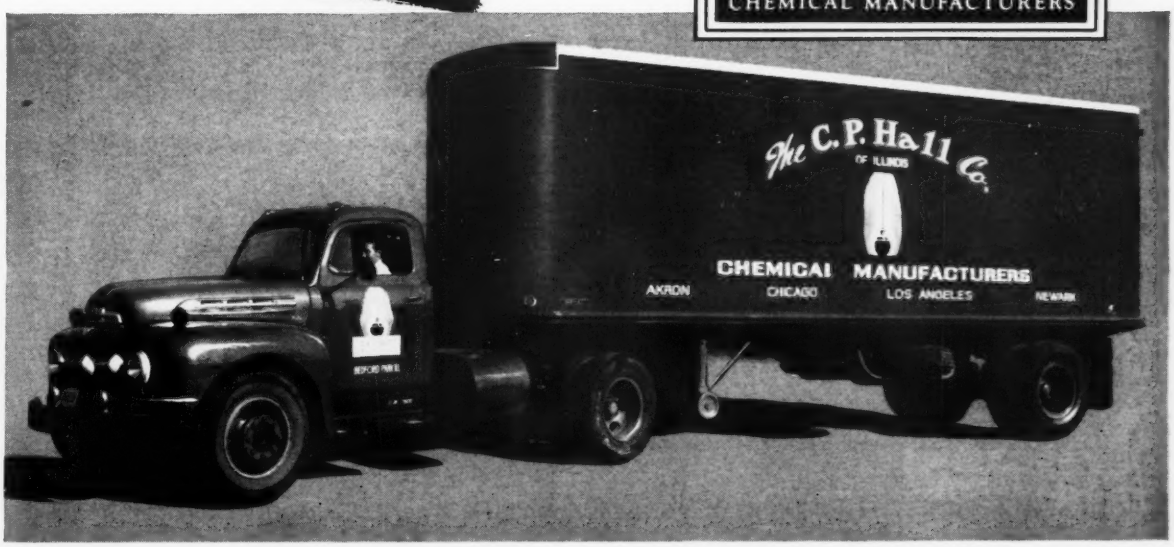

"GR-S Code Number Revisions & Replacements." Phillips Chemical Co., Evans Bldg., Akron, O. 3 pages. This folder provides tables on available GR-S polymers and masterbatches, and revised GR-S code numbers in accordance with the new numbering system. The information supersedes similar tables compiled August 8, 1952.

"Hi-Sil C." Pigment Data Bulletin No. 53-2. Columbia-Southern Chemical Corp., Fifth Ave. at Bellefield, Pittsburgh 13, Pa. 4 pages. This bulletin contains laboratory compounding data illustrating the properties of vulcanizates obtainable with this reinforcing pigment.

"Roth Research Brings Results with Rubber." Roth Rubber Co., Chicago 50, Ill. 12 pages. The company's laboratory and production facilities, as well as typical problems which have been solved by the firm, are described and illustrated in this publication.

"Current Safety Topics in the Rubber Industry." Volume 28. National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill. 14 pages. This booklet contains the addresses presented in the sessions of the Rubber Section of the fortieth National Safety Congress on safety in the rubber industry.

"Silicone Rubber: A New Insulating Material for Wire and Cable." No. CDS-13. General Electic Co., Pittsfield, Mass. 5 pages. The properties and processing data, including charts and tables, of silicone rubber are set forth in this illustrated booklet.

"Custom Molded Rubber Parts." Bulletin No. 5201A1. Parker Appliance Co., Cleveland, O. 4 pages. The company's new and expanded facilities for the production of special synthetic compounds, and new methods and processes for custom molding are described and illustrated in this catalog insert.

"We Put Ingenuity into Shape." Standard Products Co., Cleveland, O. 18 pages. This illustrated booklet describes some of the activities of the company, including the manufacture of channel guides, seals, and bonding materials.

"Bakelite Polyethylene." Bakelite Co., New York, N. Y. 22 pages. New information on the properties, applications, and methods of fabricating polyethylene is contained in this illustrated booklet.

"Universal Flexible Metal Hose Products." Technical Data Book U-111. Universal Metal Hose Co., Chicago, Ill. 22 pages. Applications, temperature ranges, dimensions, couplings, and assemblies of various types of metal and wire braided hose made by the company are described and illustrated in this booklet.

"The Magic Wand." Bulletin No. 125. Herman H. Sticht Co., Inc., New York, N. Y. 8 pages. This publication illustrates the principle of operation and the characteristic properties of typical electrostatic neutralizers and of the company's new induction-type neutralizer, the "Magic Wand."

"Emery 892-R Pelargonic Acid." Bulletin No. 46. Emery Industries, Inc., Carew Towers, Cincinnati, O. 4 pages. This booklet contains tentative specifications, typical characteristics and composition data, and applications of the company's improved grade of pelargonic acid.

"Standards—Engineering Tools for Industry." American Standards Association, Inc., 70 E. 41st St., New York, N. Y. 64 pages. Price, $2. This manual contains the proceedings of the Third National Standardization Conference and the principal addresses presented at the thirty-fourth annual meeting award luncheon.

"Symposium on Recent Developments in the Evaluation of Natural Rubber." Special Technical Publication No. 136. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. 116 pages. This publication is a compilation of eight papers presented at the fifty-fifth annual meeting of the ASTM held in New York, N. Y., June 26, 1952.

"FHP Belts." Raybestos-Manhattan, Inc., Passaic, N. J. 98 pages. This fractional horsepower V-belt catalog gives belt listings according to the new industry-standard numbering system and machine listings by company or trade names for convenience in determining the proper belt to use for light-duty applications.

"Thirteenth Semi-Annual Report of the Atomic Energy Commission." January, 1953. United States Atomic Energy Commission, Washington, D. C. 214 pages. **"Who . . . Me?** The Travelers 1953 Book of Street and Highway Accident Data." The Travelers Insurance Cos., Hartford, Conn. 32 pages. Publications of Underwriters' Laboratories, Inc., 207 E. Ohio St., Chicago 11, Ill.: **"Fire Protection Equipment List.** January, 1953" and **"Bi-Monthly Supplement.** February, 1953." 251 and 91 pages, respectively. Publications of National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill.: **"Occupational Safety Services."** Service Guide 2.1, February 15, 1953. 52 pages. **"'53 Directory**—Occupational Safety Posters." 76 pages.

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(Classified Advertisements Continued on Page 277)

MARKET REVIEWS

RUBBER

MODERATE trading activity and continued falling prices were noted on the physical rubber market during the period from March 16 to April 15. Lack of buying demand combined with Korean developments to force spot prices down both in the domestic and foreign markets. As prices dropped to levels competitive with synthetic rubber prices, buying interest revived and active purchases in large quantities were made by tire manufacturers on the local market. Cabled offerings from the Far East were priced at higher levels and, as a consequence, activity in physical rubber was confined to the local market.

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	Jan. 31	Feb. 28	Mar. 21	Mar. 28	Apr. 4	Apr. 11
R. S. S.: #1	28.50	28.00	26.50	26.25	25.50	24.75
2	27.63	27.25	25.75	25.50	24.75	24.00
3	26.88	26.00	24.50	24.25	23.50	22.75
Latex Crepe:						
#1 Thick	35.38	32.25	31.00	30.75	29.75	28.75
Thin	35.38	32.50	31.00	30.50	29.50	28.50
#3 Amber Blankets	25.63	25.25	24.38	24.00	23.25	22.25
#3 Thin Brown Crepe	24.63	24.25	23.38	23.00	22.25	22.25
Flat Bark	23.63	22.25	21.63	21.38	21.00	19.75

The spot price for #1 Ribbed Smoked Sheets started the period at 26.25¢, held at a high of 26.50¢ from March 18-25, declined to a low of 24.00¢ on April 8, and then recovered to end the period at 24.75¢. The March monthly average spot prices for certain grades were as follows: #1 R.S.S., 26.84¢; #3 R.S.S., 24.87¢; #3 Amber Blankets, 24.39¢; and Flat Bark, 21.67¢.

COMMODITY EXCHANGE
WEEK-END CLOSING PRICES

Futures	Jan. 31	Feb. 28	Mar. 21	Mar. 28	Apr. 4	Apr. 11
July	27.00	26.50	25.75	25.00	24.50	24.15
Oct.	26.55	26.25	25.35	25.20	24.30	23.90
Dec.	26.20	26.00	25.15	24.90	24.10	23.80
Mar.	26.20	25.85	25.10	24.65	23.90	23.70
May	....	....	25.05	24.40	23.70	23.60
Total weekly sales, tons	1,250	2,190	2,280	1,340	2,780	2,000

Rubber futures prices on the Commodity Exchange followed the lead of the physical market and showed a decline over the period. Trading was moderate in volume, except when prices fell to new life-of-contract lows early in April. A technical price advance took place at the end of the period as the result of short covering and profit taking operations. Illustrating the price movements, July futures started the period at 25.35¢, rose to a high of 25.90¢ on March 24, fell to a low of 23.21¢ on April 8, and ended the period at 24.00¢.

Sales volume in the #1 Contract during the second half of March amounted to 5,840 tons, making a total for the month of 12,770 tons. Sales in the #1 Contract during the first half of April totaled 4,930 tons. There were no sales in the #3 Contract during the period.

Latex

SUPPLIES of bulk *Hevea* latex for spot or nearby delivery continued to be virtually non-existent during the period from March 16 to April 15. Small offerings of drum material from the Far East were available at generally attractive prices and apparently indicated a temporary drying up of European market demand since domestic price levels are lower than those on the Continent.

A certain amount of pessimism has crept into the latex market outlook for the latter part of this year, based on reports that foam requirements for the automotive industry will drop below current levels, and an anticipation of increased latex output in the Far East. Coupled with the recent decline in crude rubber prices, this attitude has markedly affected the willingness of some consumers to enter into forward contracts.

Most market observers, however, still believe that latex will be tight throughout the year. This opinion is based on reports that the upholstery trade is ready to take up any slack in demand for foam sponge by the automotive industry, indications that the seasonably low demand for latex on the Continent is ending, and some uncertainty as to whether latex output will rise during the last half of this year.

Final January and preliminary February domestic statistics on *Hevea* and synthetic rubber latices are given below:

(All Figures in Long Tons, Dry Weight)

	Production	Imports	Consumption	Month-End Stocks
Natural latex				
Jan.	0	6,250	6,097	6,340
Feb.*	0	5,500	5,696	6,847
GR-S latices				
Jan.	4,063	227	4,219	4,940
Feb.*	3,877	222	4,106	5,117
Neoprene latex				
Jan.	895	0	739	1,143
Feb.*	819	0	695	1,194
Nitrile latices				
Jan.	451	0	344	913
Feb.*	437	0	305	1,014

*Preliminary.

RECLAIMED RUBBER

THERE were no changes in the reclaimed rubber market picture during the period from March 16 to April 15. As during the past few months, demand for the staple grades of reclaim continued at a fairly even rate, with no changes in prices.

Final January and preliminary February statistics on the domestic reclaimed rubber industry are now available. January figures, in long tons, are: production, 26,784; imports, 474; consumption, 24,696; exports, 866; and month-end stocks, 31,244. Preliminary figures for February follow: production, 24,350; imports, 255; consumption, 23,929; exports, 939; and month-end stocks, 30,350.

Reclaimed Rubber Prices

	Lb.
Whole tire: first line	$0.10
Fourth line	.0875
Inner tube: black	.15
Red	.2425
Butyl	.125
Pure gum, light colored	.2425
Mechanical, light colored	.135

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

SCRAP RUBBER

QUIET trading continued to characterize the scrap rubber market during the period from March 16 to April 15. April orders to scrap tires were reported to total only about 300 tons, approximately the same volume as for March, and the outlook for May was dim. Scrap tubes were virtually at a standstill in the East and what little demand for scrap tires that was evident came from Akron. Eastern dealers were reported to be shipping scrap tubes to Akron at the following prices: black auto tubes, 3.25¢ per pound; butyl tubes, 2.25¢; and red auto tubes, 10.50-11.00¢.

In the eastern figures for mixed tires in the table below, the $9.00 per ton figure was said to apply to shipments containing auto casings only. Shipments guaranteed to contain a minimum of 30% truck and bus tires were sold at $12 per ton, but where this minimum was not maintained the suppliers were being charged back as much as $3 per ton. The outlook in the scrap rubber market is for no change in trading conditions to take place in the near future.

Following are dealers' selling prices for scrap rubber, in carload lots, delivered to mills at the points indicated:

	Eastern Points	Akron, O.
	(Per Net Ton)	
Mixed auto tires	$9.00/$12.00	$14.00/$14.50
S. A. G. auto tires	Nom.	Nom.
Truck tires	Nom.	15.00
Peelings, No. 1	40.00	40.00/42.00
2	23.00	24.00
3	20.00	20.00
	(¢ per Lb.)	
Auto tubes, mixed	2.00	2.50
Black	3.25	3.25
Red	10.00/10.50	11.00
Butyl	1.50/2.00	2.25

COTTON AND FABRICS

NEW YORK COTTON EXCHANGE
WEEK-END CLOSING PRICES

Futures	Jan. 31	Feb. 28	Mar. 21	Mar. 28	Apr. 4	Apr. 11
July	33.85	33.55	33.51	33.48	33.29	33.35
Oct.	33.73	33.70	33.52	33.55	33.40	33.40
Dec.	33.81	33.71	33.60	33.62	33.48	33.49
Mar.	34.02	33.92	33.72	33.75	33.57	33.59
May	34.03	33.89	33.72	33.74	33.55	33.56
July	....	....	....	33.47	33.30	33.31

COTTON spot and futures prices showed a general decline over the period from March 16 to April 15. Most of the price drop took place during the latter half of March in view of liquidations of May contracts, continued slow spot sales, a lagging textile demand, and the continuing failure of export demand to show any improvement. During the first half of April, prices held steady in general, as traders were inclined to await further developments in the Korean truce talks.

The spot price for $1\frac{5}{16}$-inch middling cotton started the period at a high of 34.35¢, dropped to a low of 33.60¢ on March 23, and then fluctuated irregularly to end the period at 33.85¢. July futures showed corresponding movement, starting at a high of 33.89¢, reaching a low of 33.15¢ on March 23, and closing the period at 33.48¢.

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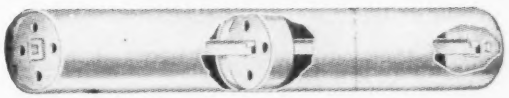

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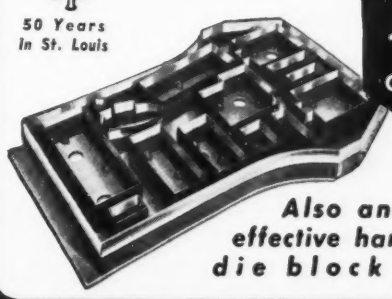

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(Classified Advertisements Continued on Page 279)

Fabrics

Trading in wide industrial fabrics continued at a moderate pace throughout the period, with most purchases being made to meet immediate needs. Chafer sales were somewhat slow early in the period, but picked up in April as tire manufacturers began to cover their June requirements. The automotive industry continued to display good demand for wide sateens, drills, twills, and headlinings. Tight-supply positions were evident in all constructions for spot or nearby delivery, and the bulk of second-quarter production appeared to have been sold out. Prospects for third-quarter sales were still uncertain, but most market observers believe the current level of production and sales will continue through that quarter.

Cotton Fabrics

Drills

59-inch 1.85-yd.	yd.	$0.30 / $0.40
2.25-yd.		.35

Osnaburgs

40-inch 2.11-yd.	yd.	.24
3.65-yd.		.155

Ducks

38-inch 1.78-yd. S. F.	yd.	nom.
2.00-yd. D. F.		.51⅞
61.5-inch, 1.35-yd. S. F.		nom.
Hose and belting		.67

Raincoat Fabrics

Print cloth, 38½-inch, 64x60	yd.	.1525 / .155
Sheeting, 48-inch, 4.17-yd.		.22⅝
52-inch, 3.85-yd.		.245

Chafer Fabrics

14.30-oz./sq. yd. Pl.	lb.	.73
11.65-oz./sq. yd. S.		.65
10.80-oz./sq. yd. S.		.6875
8.9-oz./sq. yd. S.		.70

Other Fabrics

Headlining, 68-inch, 1.35-yd., 2-ply	yd.	.575
68-inch, 1.25-yd., 2-ply		.635 / .65
Sateens, 53-inch, 1.32-yd.		.585
58-inch, 1.21-yd.		.6375 / .64

Tire Cords

K. P. std., 12-4-2	lb.	nom.

RAYON

MARCH shipments of all types of rayon by American producers to domestic consumers totaled 102,400,000 pounds, an increase of 15% over the February figure. Shipments for the first quarter of 1953 amounted to 292,600,000 pounds, or 18% higher than the total during the same 1952 quarter.

Calculated production of viscose high-tenacity yarn during March reached a record of 41,800,000 pounds, or 103% of rated capacity. This production was 5,400,000 pounds greater than the February figure and gave a first-quarter total of 116,900,000 pounds. Total shipments, both domestic and for export, of high-tenacity yarn during March amounted to 42,600,000 pounds, giving a first quarter total of 116,900,000 pounds shipped. Stocks of high-tenacity yarn at the end of March were 5,300,000 pounds.

No changes were made in rayon tire cord and fabric prices during the period from March 16 to April 15, and current prices follow:

Rayon Prices

Tire Yarns

1100/480	$0.63
1100/490	.62
1150/490	.62
1650/720	.62
1650/980	.61
1900/980	.61
2200/960	.61
2200/980	.60
4400/2934	.63

Tire Fabrics

1100/490/2	.72
1650/980/2	$0.659 / .73
2200/980/2	.685

FINANCIAL

(Continued from page 246)

The Goodyear Tire & Rubber Co. of Canada, Ltd., New Toronto, Ont. For 1952: net profit, $4,337,795, equal to $15.69 a common share, compared with $3,936,535, or $14.26 a share, in the preceding year; provision for depreciation, $1,503,822, against $2,788,691; income taxes, $3,756,147, against $4,452,788.

Byron Jackson Co., Los Angeles, Calif. For 1952: net earnings, $1,388,385, equal to $2.62 a share, contrasted with $2,020,845, or $3.81 a share, in 1951.

Jenkins Bros., Bridgeport, Conn. For 1952: net profit, $300,155, equal to $2.35 a share, contrasted with $556,314, or $4.36 a share, the year before.

Johns-Manville Corp., New York, N. Y. March quarter, 1953: net profit, $4,943,491, equal to $1.56 a common share, against $5,508,387, or $1.74 a share, in the 1952 quarter.

Johnson & Johnson, New Brunswick N. J. For 1952: net income, $8,169,861, equal to $3.82 a common share, against $8,126,460, or $3.78 a share, in 1951.

Lee Tire & Rubber Corp., Conshohocken, Pa. Three months to January 31, 1953: net profit, $394,279, equal to $1.49 a share, against $530,300, or $2.09 a share, a year earlier.

Link Belt Co., Chicago, Ill., and subsidiaries. For 1952: net earnings, $8,039,915, equal to $4.82 a common share, against $8,166,453, or $4.93 a share, in 1951; net sales $126,582,115, a new high against $118,437,217.

Minnesota Mining & Mfg. Co., St. Paul, Minn., and domestic subsidiaries. For 1952: net profit, $16,089,995, equal to $1.96 a common share, compared with $15,738,452, or $1.92 a share, the year before; net sales, $185,241,760 (a new high), against $170,067,527; federal income and excess profits taxes, $25,300,000, against $23,900,000; current assets, $87,903,501, current liabilities, $38,514,582, against $84,640,132 and $36,178,349, respectively, on December 31, 1951.

The Mohawk Rubber Co., Akron, O. For 1952: net profit, $683,658, equal to $4.83 a share, contrasted with $1,072,313, or $7.57 a share, in 1951; net sales, $19,189,795, against $20,884,078; taxes, $1,282,709, against $2,425,116; current assets, $5,425,592, current liabilities, $2,405,513.

Monsanto Chemical Co., St. Louis, Mo., and subsidiaries, excluding British and Australian ones. Twelve months to December 31, 1952: net profit, $23,189,243, equal to $4.29 each on 5,268,189 common shares, compared with $23,477,884, or $4.70 each on 4,868,189 shares, in the preceding 12 months; net sales, $266,704,442, against $272,845,034.

Three months to March 31, 1953: net earnings, $5,814,223, equal to $1.08 a share, against $5,398,196, or $1 a share, in the 1952 quarter; sales, $85,518,922, against $63,591,979.

Mt. Vernon-Woodberry Mills, Inc., New York, N. Y. For 1952: net profit, $2,967,586, equal to $4.61 a common share, against $4,192,000, or $6.53 a share, in 1951.

National Automotive Fibres, Inc., Trenton N. J. For 1952: net earnings, $2,053,346, equal to $2.06 a share, against $3,200,220, or $3.21 a share in 1951.

National Lead Co., New York, N. Y. For 1952: net income, $23,060,054, equal to $2.06 a share, against $22,993,717, or $2.05 a share, in 1951.

National Rubber Machinery Co., Akron, O. For 1952: net profit, $532,900, equal to $3.03 each on 176,000 capital shares, against $675,628, or $3.84 a share, in 1951; net sales, $19,148,454, against $12,016,027.

Skelly Oil Co., Kansas City, Mo. For 1952: net income, $28,032,692, equal to $9.75 a share, compared with $31,074,985, or $10.81 a share, the year before.

United States Rubber Statistics — January, 1953

(All Figures in Long Tons, Dry Weight)

	New Supply			Distribution		Month-End Stocks
	Production	Imports	Total	Consumption	Exports	
Natural rubber, total	0	57,517	57,517	41,669	528	91,390
Latex, total	0	6,250	6,250	6,097	0	6,340
Rubber and latex, total	0	63,767	63,767	47,766	528	97,730
Synthetic rubbers, total	*61,281 †8,201	1,516	70,998	72,810	1,467	117,875
GR-S types‡	*55,761 †12	1,339	57,112	58,789	298	83,921
Butyl	*5,520	177	5,697	7,097	43	21,096
Neoprene‡	†6,619	0	6,619	5,516	961	9,001
Nitrile types‡	†1,570	0	1,570	1,408	165	3,857
Natural rubber and latex, and synthetic rubbers, total	69,482	65,283	134,765	120,576	1,995	215,605
Reclaimed rubber, total	26,784	474	27,258	24,696	866	31,249
GRAND TOTALS	96,266	65,757	162,023	145,272	2,861	246,854

* Government plant production.
† Private plant production.
‡ Includes latices.
SOURCE: Rubber Division, NPA, United States Department of Commerce, Washington, D. C.

U. S. Imports, Exports, and Reexports of Crude and Manufactured Rubber

Imports for Consumption of Crude and Manufactured Rubber

	December, 1952	
	Quantity	Value
UNMANUFACTURED, Lbs.		
Crude rubber	161,638,577	$38,104,339
Latex	13,512,094	3,817,116
Balata	296,730	145,270
Jelutong or Pontianak	226,906	87,548
Gutta percha	30,384	25,878
Crude chicle	645,906	424,896
Synthetic rubber	3,308,994	870,018
Reclaimed rubber	78,368	3,708
Scrap rubber	2,123,600	128,679
TOTALS	181,961,559	$43,607,452
MANUFACTURED		
Rubber tires		
Auto, etc. *no.*	4,406	$223,522
Bicycles *no.*	7,518	5,665
Other *no.*	177	8,573
Inner tubes:		
Auto, etc. *no.*	319	633
Footwear: boots *prs.*	16,850	50,512
Shoes and overshoes *prs.*	37,639	31,437
Rubber-soled canvas shoes *prs.*	12,929	10,451
Athletic balls		
Golf *no.*	8,880	2,144
Tennis *no.*	15,840	401
Other *no.*	72,360	7,793
Toys	....	37,686
Hard rubber goods:		
Combs *no.*	7,200	487
Other	....	851
Rubberized printing blankets *lbs.*	2,750	6,017
Rubber and cotton packing *lbs.*	2,026	3,559
Gaskets and valve packing	....	7,891
Molded insulators	....	5,837
Belting *lbs.*	4,213	6,940
Hose and tubing	....	15,456
Gloves *prs.*	61,920	24,934
Nipples and pacifiers *gr.*	2,150	3,856
Instruments *doz.*	4,070	3,840
Bands *lbs.*	3,196	2,831
Other	....	2,599
Gutta percha manufactures *lbs.*	1,215	1,167
Synthetic rubber products	....	22,168
Other soft rubber goods	....	99,308
TOTALS	....	$586,558
GRAND TOTALS, ALL RUBBER IMPORTS	....	$44,194,010

SOURCE: Bureau of the Census, United States Department of Commerce, Washington, D. C.

Exports of Domestic Merchandise

	December, 1952	
	Quantity	Value
UNMANUFACTURED, Lbs.		
Chicle and chewing-gum bases	427,231	$199,833
Balata, gutta percha, etc.	685	1,759
Synthetic rubbers:		
GR-S type	563,258	151,838
Butyl	294	139
Neoprene	1,935,854	774,091
Nitrile types	419,348	203,355
Other	44,942	35,255
Reclaimed rubber	2,271,483	201,383
Scrap rubber	2,894,045	70,787
TOTALS	8,557,140	$1,638,440
MANUFACTURED		
Rubber cement *gals.*	68,030	$152,716
And rubberized fabric *sq. yds.*	186,919	193,810
Clothing	....	162,439
Glove and mittens *doz. prs.*	11,550	55,307
Footwear:		
Boots and shoes *prs.*	12,774	37,815
Rubber-soled canvas shoes *prs.*	11,571	22,046
Heels *doz. prs.*	56,054	67,056
Soles, soling, top-lift sheets *lbs.*	770,054	196,392
Drug sundries	....	162,078
Toys, balls, novelties	....	65,053
Hard rubber goods		
Battery boxes *no.*	30,229	52,943
Other electrical *lbs.*	103,981	65,889
Other	....	27,428
Rubber tires and casings		
Truck and bus *no.*	47,043	2,452,118
Auto and motorcycle *no.*	48,452	649,975
Aircraft *no.*	1,820	126,808
Off-the-road *no.*	10,646	1,311,133
Farm tractor *no.*	3,971	190,092
Implement *no.*	1,821	45,658
Other *no.*	15,097	42,370
Inner tubes		
Auto *no.*	17,704	36,935
Truck and bus *no.*	30,722	181,316
Aircraft *no.*	551	7,436
Other *no.*	18,124	57,581
Solid tires		
Truck and industrial *no.*	991	21,699
Tire repair material		
Camelback *no.*	456,067	136,496
Other *no.*	242,793	227,202
Tape, except medical and friction *lbs.*	37,714	35,684
Mats and matting *lbs.*	350,524	113,092
Thread		
Bare *lbs.*	11,935	19,392
Textile covered *lbs.*	11,726	38,109
Rubber		
Belting		
V-type *lbs.*	92,381	137,572
Transmission		
V-type *lbs.*	83,389	182,849
Flat belts *lbs.*	50,487	80,425
Conveyors and elevator *lbs.*	79,713	90,377
Other *lbs.*	5,862	9,472
Hose		
Molded and braided *lbs.*	312,469	288,585
Wrapped and hand built *lbs.*	174,363	167,486
Other hose and tubing *lbs.*	62,398	81,614
Packing		
Sheet type *lbs.*	64,500	35,373
Other *lbs.*	131,704	170,511
Tiling and flooring *lbs.*	121,294	31,536
Compounded rubber for further manufacture *lbs.*	1,208,259	349,370
Other rubber manufactures *lbs.*	.....	560,155
TOTALS	.....	$9,139,482
GRAND TOTALS, ALL RUBBER EXPORTS	.....	$10,777,922

Reexports of Foreign Merchandise

UNMANUFACTURED, Lbs.		
Crude rubber	1,379,506	$417,656
Balata, gutta percha, etc.	5,443	1,725
Synthetic rubber, GR-S type	18,743	8,965
TOTALS	1,403,692	$428,346
MANUFACTURED		
Rubber boots and shoes	1,100	$7,383
Drug sundried	.....	450
Toys, balls, novelties	.....	378
Other natural and synthetic rubber manufactures	.....	204
TOTALS	.....	$8,415
GRAND TOTALS, ALL RUBBER REEXPORTS	.....	$436,761

Estimated Automotive Pneumatic Casings and Tubes—Shipments, Production, Inventory, February - January, 1953; First Two Months, 1953-1952

	Feb., 1953	% of Change from Preceeding Month	Jan., 1953	1953, First Two Months	1952, First Two Months
Passenger Casings					
Shipments					
Original equipment	2,763,890		2,563,419	5,327,309	3,459,858
Replacement	3,160,616		3,915,914	7,076,530	6,459,250
Export	28,262		33,090	61,352	110,021
TOTAL	5,952,768	−8.59	6,512,423	12,465,191	10,029,129
Production	6,847,398	+0.34	6,824,097	13,671,495	12,256,041
Inventory end of month	12,310,653	+9.06	11,287,880	12,310,653	9,180,348
Truck and Bus Casings					
Shipments					
Original equipment	498,892		440,465	939,357	965,037
Replacement	734,664		877,945	1,612,609	1,515,075
Export	56,841		50,858	107,699	202,356
TOTAL	1,290,397	−5.76	1,369,268	2,659,665	2,682,468
Production	1,389,055	−1.76	1,413,890	2,802,945	3,078,650
Inventory end of month	2,984,510	+5.47	2,829,636	2,984,510	2,189,978
Total Automotive Casings					
Shipments					
Original equipment	3,262,782		3,003,884	6,266,666	4,424,895
Replacement	3,895,280		4,793,859	8,689,139	7,974,325
Export	85,103		83,948	169,051	312,377
TOTAL	7,243,165	−8.10	7,881,691	15,124,856	12,711,597
Production	8,236,453	−0.02	8,237,987	16,474,440	15,334,691
Inventory end of month	15,295,163	+8.34	14,117,516	15,295,163	11,370,326
Passenger, Including Motorcycle and Truck and Bus Tubes					
Shipments					
Original	3,261,469		3,012,081	6,273,550	4,427,938
Replacement	3,051,625		4,476,664	7,528,289	5,791,073
Export	50,576		49,089	99,665	221,716
TOTAL	6,363,670	−15.58	7,537,834	13,901,504	10,440,727
Production	6,427,551	+4.85	6,130,234	12,557,785	10,720,198
Inventory end of month	10,307,944	+1.36	10,169,168	10,307,944	10,506,748

NOTE: Cumulative data on this report include adjustments made in prior months.
SOURCE: The Rubber Manufacturers Association, Inc., New York, N. Y.

Compounding Ingredients—Price Changes and Additions

Accelerator-Activators, Inorganic

Litharge, Eagle *lb.*	$0.1475/	$0.1485
National Lead *lb.*	.1475/	.1485
Red lead, Eagle *lb.*	.1575	
National Lead *lb.*	.1575/	.16
White lead, basic Eagle, National Lead *lb.*	.1525/	.1625
White lead silicate Eagle *lb.*	.1625/	.18
National Lead *lb.*	.1475/	.1575

Chemical Stabilizers

Eagle Basic Silicate White Lead 201 *lb.*	.17 /	.18
202 *lb.*	.1625/	.1725

Colors, White, Zinc Oxide

Azo 35%, 50% leaded *lb.*	.14 /	.15
Eagle 35%, 50% leaded *lb.*	.14 /	.15
Lehigh 35%, 50% leaded *lb.*	.14 /	.15

Plasticizers and Softeners

Nevillac *lb.*	.31 /	.85

Reclaiming Oils

X-1 Resinous Oil *lb.*	.021 /	.03

Reinforcers Other Than Carbon Blacks

Aluminum Flake *ton*	19.00 /	60.00
#5 *ton*	23.50 /	26.50
22 *ton*	19.00 /	22.50
Hi-Sil C *lb.*	.11 /	.125

Solvents

Nevsol H *gal.*	.19 /	.29
HF. T *gal.*	.24 /	.34

Tackifiers

Nevindene *lb.*	.15 /	.18

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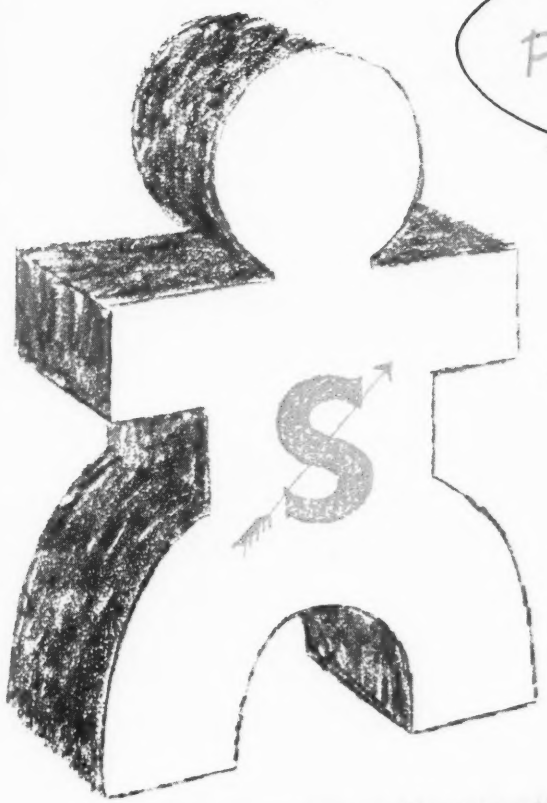

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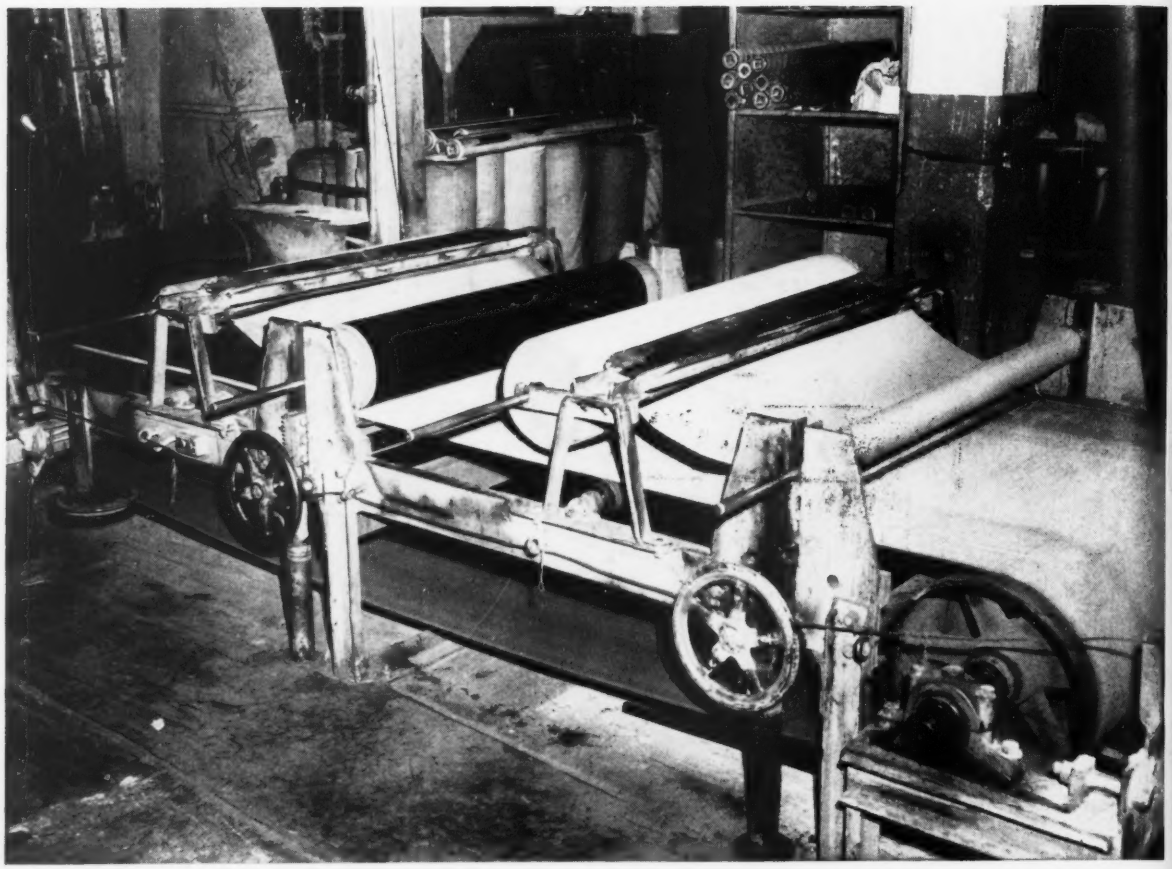

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